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THE ENGINEER

JULY 10, 1959 28 ESSEX ST., STRAND, LONDON, W.C.2 VOL. 208 No. 5398

PUBLIC APPOINTMENTS

UNIVERSITY OF MANCHESTER

LECTURER IN ENGINEERING (NUCLEAR)

Applications are invited for the post of LECTURER IN ENGINEERING (NUCLEAR). Candidates should be graduates in engineering or physics: experience of experimental reactor physics or heat transfer would be an advantage. The successful candidate will take part in teaching and research work in the Nuclear Engineering Laboratory. University regulations permit teaching staff to read for the degrees of M.Sc. and Ph.D. Applications will also be considered from engineers and physicists who would be interested in a temporary appointment of two or more years. The salary scale is £900 to £1,650 per annum. Membership of the F.S.S.U. and Children's Allowance Scheme. Initial salary according to qualifications and experience. Applications should be sent not later than July 18th, 1959, to the Registrar, the University, Manchester, 13, from whom further particulars and forms of application may be obtained. Applications by airmail (no forms) will be considered from overseas candidates. E6755

CITY OF LIVERPOOL EDUCATION COMMITTEE CITY COLLEGE OF TECHNOLOGY

Byrom Street, Liverpool 3.

Principal: S. A. J. PARSONS, B.SC. (Econ.), M.I.MECH.E., M.I.PROD.E., M.B.I.M.

Department of Civil and Mechanical Engineering
Production Engineering Section

The Governing Body invite applications from suitably qualified men for the appointment of SENIOR LECTURER in Production Engineering. Salary (Men) £1,350 × £50 to £1,550 per annum plus 5%. (Burnham Technical Report). Applicants must have had appropriate industrial experience and teaching experience is desirable. Duties to commence as soon as possible.

The person appointed should be capable of leading the Production Section and undertaking the following duties:—

(*a*) developing the new laboratories and workshops in Phrase II of the new College;
(*b*) developing project work for advanced students;
(*c*) initiating and supervising research;
(*d*) organising and supervising post-advanced courses in the Production Engineering field;
(*e*) initiating contacts with industrial firms in the area and co-operating with them on projects of research work.

This college provides regional courses mainly at the advanced level and possesses adequate facilities in this specialist field.

Further particulars and application form (returnable by 18th, July, 1959) from H. S. Magnay, M.A., Director of Education, 14, Sir Thomas Street, Liverpool, 1.

THOMAS ALKER,
Town Clerk and Clerk to
Local Education Authority

(J5732) E6827

WARWICKSHIRE EDUCATION COMMITTEE NUNEATON TECHNICAL COLLEGE AND SCHOOL OF ART

Principal: W. HOWARD JOINT, M.A. (Oxon)

ASSISTANTS GRADE B

Applications are invited for the following posts, the appointments to be as from 1st January, 1960, or earlier if possible.

1. *Assistant Grade B* to teach Mathematics to Higher National Certificate in the Engineering departments.
2. *Assistant Grade B* to teach Mathematics up to Higher National Certificate in the Mining department. Ability to take some share of the teaching of Science and/or Engineering drawing would be an advantage.

Salaries for men will be in accordance with the Burnham Further Education Report:

Grade A, £498 15s. 0d. by £26 5s. 0d. to £945.

Grade B, £682 10s. 0d. by £26 5s. 0d. to £1076 5s.0d. with appropriate additions in both cases of approved training, qualifications and previous teaching and/or industrial experience.

Application forms and further particulars may be obtained from the Principal, Technical College and School of Art, Hinckley Road, Nuneaton, and should be returned as soon as possible.

N. A. Y. Yorke-Lodge
County Education Officer.
E.6843

PORT OF GREENOCK ASSISTANT GENERAL MANAGER

Applications are invited for the post of Assistant General Manager to the Greenock Harbour Trust. The appointment will run until the retirement of the present General Manager and Engineer in November 1960 when the appointee will be considered for promotion as may then be decided. Candidates should already have administrative experience, and engineering qualifications, while not essential, may be of advantage. The immediate salary offered is not less than £1500 according to qualifications; a contributory superannuation scheme is in operation in conjunction with the Local Authority. Occupancy of a house is available for a General Manager.

Ten copies of applications with full particulars of age, qualifications and experience and the names and addresses of not less than two referees should be forwarded before 31st August 1959 in a cover marked "Assistant General Manager" to the Chairman, Greenock Harbour Trust, Customhouse Quay, Greenock. E.6858.

BOROUGH OF FARNWORTH
Main outfall sewer
Contract No. 5

APPOINTMENT OF RESIDENT ENGINEER

Applications are invited from suitably qualified engineers for the temporary appointment of Resident Engineer to supervise the construction of a 78 in. diameter brick-lined sewer in tunnel, 57 in. diameter to 78 in. diameter concrete pipes laid in open trench, various manholes and ancillary works.

Applicants should have had experience of tunnelling using pre-cast concrete segments and of open trench work in waterlogged ground. The work will be carried out under the direction of Messrs. J. D. & D. M. Watson, M.M.I.C.E., Consulting Engineers to the Borough of Farnworth and the probable duration will be 18 months. The salary will be in the range of £1,250 to £1,500 per annum and will depend on qualifications and experience.

Applications, stating age, qualifications and experience together with the names and addresses of two referees must reach the undersigned not later than 17th July, 1959.

THOMAS HITCHEN,
Town Clerk.

Town Hall,
Farnworth,
Lancs. E.6850

CITY AND COUNTY OF KINGSTON-UPON-HULL

CITY ENGINEERS' DEPARTMENT
APPOINTMENT OF ENGINEERING ASSISTANT (MECHANICAL)

Special Scale £785—£1,070 per annum. Commencing salary according to experience.

Applications are invited for the above appointment, preferably from candidates who are Associate Members of the Institution of Mechanical Engineers.

Previous experience in Material Handling, Steam Generation, Heavy Duty Pumping Machinery, Diesel Propulsion, or Heating and Ventilation would be utilized to the full, and opportunities would also arise to obtain general experience in Electrical Engineering.

Housing accommodation will be made available for the successful married candidate if not already resident in the City. Consideration will be given to a contribution towards removal expenses.

Applications on forms to be obtained from the City Engineer, Guildhall, Kingston-upon-Hull, should be returned within fourteen days of the publication of this advertisement.

Wm. MORRIS, O.B.E.
City Engineer.

Guildhall,
Kingston-upon-Hull. E.6836

GOVERNMENT OF QATAR PERSIAN GULF

ASSISTANT
DISTILLATION PLANT ENGINEER
WATER DEPARTMENT

The Government of Qatar in the Persian Gulf invites applications for the post of Assistant Distillation Plant Engineer in the Water Department. The successful applicant will be required to assist the Distillation Plant Engineer in the maintenance of sea water distillation plants and the mechanical equipment of the department.

Candidates must have completed a regular apprenticeship of at least five years with a recognised organisation engaged in heavy engineering in dock, ship or railway yards. They should possess appropriate professional qualifications and have a wide experience in a supervisory capacity of marine maintenance engineering including steam plants and boilers. Experience as naval chief engine room artificers or merchant navy engineers will be a recommendation. Salary: According to scale E2, commencing at Indian Rupees 1775/- per Arabic month (equivalent to £1,598 per annum) with yearly increments of Rs.75 a month to Rs.2000/- then by Rs.100 to a maximum of Rs.2300/-. Contract offered is for five years subject to six months probation. Gratuity of one month's pay for every year of service payable on completion of contract only. Annual leave at rate of six days per month of duty. Free passages, accommodation, fuel, light, water, medical and dental treatment. No income tax. APPLICATIONS—endorsed "Asst. Distillation Plant Engineer" should be sent *in duplicate* to: C. Tennant Sons & Co. Ltd., 4 Coptall Avenue, London, E.C.2, giving full details of training, experience, age, nationality, religion, marital status, the names and addresses of three referees and a recent dated photograph. E6795

UNIVERSITY OF WITWATERSRAND JOHANNESBURG, SOUTH AFRICA
LECTURESHIP IN ELECTRICAL ENGINEERING

Applications are invited for appointment to the above post. Applicants should hold a university degree in Electrical Engineering and should preferably be experienced in automatic control and be prepared to teach in that subject. The department has facilities for research in electrical machines, telecommunications and high voltage electrical engineering and proposes to expand its facilities in control engineering. Duties are to be assumed on 1st January, 1960, or as soon as possible thereafter.

The salary scale attached to the post is £1170 × £60 —£1,650. The initial notch will be determined in accordance with the qualifications and experience of the successful candidate. In addition, it is anticipated that an annual vacation savings bonus of £60 will be paid in October each year.

Membership of the Provident Fund is compulsory, which involves a contribution at the rate of 7% of the salary. Membership of the Staff Medical Aid Fund is obligatory in the case of an officer who is found eligible for membership.

Applicants are advised to obtain a copy of the information sheet relating to this vacancy from the Secretary, Association of Universities of the British Commonwealth, 36 Gordon Square, London, W.C.1.

Applications close in South Africa and London on 31st August, 1959. E6831

UNIVERSITY OF BIRMINGHAM DEPARTMENT OF INDUSTRIAL METALLURGY LECTURESHIP

Applications are invited for a Lectureship in the Department of Industrial Metallurgy to lecture to final year and postgraduate students. Good facilities are provided for research. Candidates should have a good degree in Metallurgy or Chemistry and industrial or research experience; ability in thermodynamics and an interest in the application of science in the field of melting and solidification would be an advantage. Salary within range £900 to £1,650 with F.S.S.U. and family allowance.

Applications (3 copies) with names of three referees, should be sent to the Deputy Registrar, The University, Birmingham 15, from whom further particulars may be obtained. E6828.

TENDERS

THE COMMISSIONERS FOR THE PORT OF CALCUTTA

TENDER FOR DREDGING AT BALARI BAR RIVER HOOGHLY

Tenders are invited from suitable contractors for dredging and disposal works at Balari Bar, River Hooghly. The approximate total quantity of material to be removed is 8 millions cu. yds.

Drawings, Conditions of Contract and Specification may be obtained from either the Chief Engineer, Commissioners for the Port of Calcutta, 15 Strand Road, Calcutta, India, puon payment of a tender fee of Rs. 20/- or from the Commissioners' Consulting Engineers and London Agents, Messrs. Rendel, Palmer & Tritton, 125 Victoria Street, Westminster, S.W.1. upon payment of a fee of £1 10s. 0d. Such tender fee will not be refundable.

Applications from Agents or other intermediaries will not be considered.

Tenderers are required, before submitting their tenders, to deposit as Earnest Money Rs10,000/- or £750 sterling and a receipt for this amount must accompany the tender. Such Earnest Money shall be returned to unsuccessful tenderers on application.

Tenders shall be submitted in triplicate in sealed covers superscribed "Tender for dredging and disposal work at Balari Bar"; one copy to Messrs. Rendel, Palmer & Tritton at 125 Victoria Street, Westminster, London, S.W.1., so as to reach them not later than 10.30 hours G.M.T. on 17th August, 1959 and two copies to the Chief Engineer, Commissioners for the Port of Calcutta, 15, Strand Road, Calcutta, India, by 16.00 hours I.S.T. on the same date.

The Commissioners do not bind themselves to accept the lowest tender, and reserve the right to reject a tender without assigning any reasons.

T. M. MALKANI
Chief Engineer,
Calcutta Port Commissioners.

15 Strand Road,
Calcutta, India. E8674.

EDUCATIONAL

A.M.I.MECH.E., B.Sc., City and Guilds, &c. Guarantee Postal Courses for all **Exams. and Technical Divisions** from Elementary to **Degree standard** including Automation Techniques. Approximately 95 per cent successes. 148-page prospectus free on request.—B.I.E.T. (Dept. 22), 29, Wright's Lane, London, W.8. E114

ELECTRONICS, covering practical and theoretical aspects, basic principles, Industrial applications, electronic apparatus, &c. Guaranteed coaching for Brit.I.R.E., City and Guilds, &c. Study at home under highly qualified tutors.—Write for free book: International Correspondence Schools, 71, Kingsway (Dept. 446A), London, W.C.2. E157

TENDERS

KINGDOM OF THAILAND ROYAL IRRIGATION DEPARTMENT BANGKOK, THAILAND

INVITATION FOR BIDS—No. YS—3—2

The Royal Irrigation Department of the Kingdom of Thailand hereby invites sealed written bids for furnishing and delivering the following goods, equipment, and materials either fob Contractors shipping point or cif Bangkok Wharf, Thailand, for the Bhumiphol Dam and Power Plant, Yanhee Multipurpose Project, Kingdom of Thailand, in accordance with the Contract Documents, Invitation for Bids—No. YS-3-2; for:

Three (3) power transformers each 56,000 kva, single phase, 50 cycles, class FOW, outdoor, 230-13.2kv, complete with oil, accessories, and spare parts.

Bids will be issued in July 1959, and opened in early October 1959. Copies of Contract Documents, Invitation for Bids—No. YS-3-2 may be obtained by qualified Bidders on written request on Bidder's letterhead addressed to:

Royal Irrigation Department,
Attention: Thai Liaison Engineer
c/o Engineering Consultants, Inc.
1940 West Mississippi Avenue,
Denver 23, Colorado.

Each request must be accompanied by a check or money order, payable to the **Royal Irrigation Department**, in the amount of U.S. $10.00 for each copy of the Contract Documents requested. The remittance is non-returnable.

M.L. Xujati Kambhu
Director General
Royal Irrigation
Department,
Kingdom of Thailand
Bangkok, Thailand.
E.6838

EDUCATIONAL

IMPERIAL COLLEGE OF SCIENCE & TECHNOLOGY

POSTGRADUATE COURSES IN ADVANCED STRUCTURAL ANALYSIS AND DESIGN

Full-time courses from October to June give up-to-date training in the modern aspects of the analysis and design of structures.

Lecture courses cover elastic and plastic methods, highly indeterminate structures, elastic stability, experimental analysis including photoelasticity design procedures, and applications to many types of structure including grids and space structures. There are also optional courses in Relaxation, matrix methods, and other mathematical techniques which are commonly used in modern structural research.

Each lecture course is accompanied by appropriate laboratory and drawing office instruction.

There is no age limit but applicants should have taken a degree course or its equivalent in the Theory of Structures.

It is hoped that the courses will be of interest and value to engineers specialising either in the design or research side Structural Analysis.

For further details write to the Registrar, Imperial College, London, S.W.7. E.6832.

SITUATIONS VACANT

A.E.I. JOHN THOMPSON

NUCLEAR ENERGY COMPANY LIMITED RADBROKE HALL, KNUTSFORD, CHESHIRE

Applications are invited from: MECHANICAL and ELECTRICAL ENGINEERS for senior and junior positions in a group co-ordinating the design of complete nuclear power stations. Candidates should have a degree or equivalent qualifications and experience of power station work will be an advantage.

The Company provides transport from the Stretford, Sale and Altrincham areas; and there are first class dining facilities. A contributory pension scheme is in operation.

Application should be made to the Chief Engineer, quoting ref: GEA/JCT.

AN INSTRUMENT ENGINEER is needed by a well known firm of CHEMICAL PLANT DESIGNERS AND CONSTRUCTORS situated near MANCHESTER. Experience, ability and capacity for work are more important than formal qualifications but technical education should be adequate to enable prescription of instrumentation to suit processes, initiation of detailed design, procurement and erection and follow on with testing and commissioning. A generous salary will be paid. Please include in your application full background details, salary expected and when available and address these to C.E., Box No. E6829 "The Engineer".

ASSISTANT ENGINEER required for large industrial concern having premises mainly in East of Scotland. Minimum qualifications required, B.SC., A.M.I.Mech.E., or equivalent with not less than 2 / 3 years Drawing Office and practical experience, and experience in controlling labour. Write Box 398 Robertson & Scott, 42, Charlotte Square, Edinburgh. E.6842

SITUATIONS VACANT

APPLICANTS ARE ADVISED TO SEND COPIES NOT ORIGINALS, OF THEIR TESTIMONIALS UNLESS OTHERWISE REQUESTED.

A KEEN YOUNG ENGINEER is required for interesting design work by a well-known company in Manchester marketing high-class fluid mixing equipment. Some experience in fluid mixing or the chemical industry generally is required but even more important is a desire to assimilate the background in the organisation and elsewhere appertaining to the subject and to apply this and basic technical knowledge to the solution of widely varying problems. A generous salary reflecting the quality of the work and the ability of the engineer selected will be paid. Your application stating education, training, experience, when available and salary expected should be addressed to D.M.D., Box No. E6790, "The Engineer".

DEPUTY CHIEF MECHANICAL ENGINEER required immediately by British firm of Consulting Engineers, for 3-year contract in India. Applicants should have good all-round steelworks engineering experience, particularly construction and installation of new plant. Administrative ability is also required. Successful applicant will be exempt from Indian income tax from date of appointment until April, 1962. Apply, with full particulars.—BOX No. E6769, "The Engineer." A

CIVIL/STRUCTURAL DRAUGHTSMAN of intermediate standard 20-25, required in our West End Office to assist in design of industrial buildings. Write to Mark Jennings Son & Partners, Consulting Engineers & Architects, 21 Conduit Street, W.1. E.2471

DESIGN ENGINEER required by an expanding firm of Chemical Engineers in their offices at Dartford, Kent, for their DIVISION supplying METALLURGICAL EQUIPMENT. The post offers excellent opportunities for a person with initiative and the successful applicant will be required to supervise the Drawing Office and engineering development of METALLURGICAL AND POWDER METALLURGY equipment and new prototypes. Applicants should have a Degree in Metallurgy or Mechanical Engineering and previous experience in the design and development of Metallurgical equipment or in the consumer field of this industry is desirable but not essential. Five day week and pension scheme. High salary to suitable person. Please apply giving details of age, experience and salary required to: Apex Construction Ltd., 15, Soho Square, London, W.1. E.6786

DEVELOPMENT ENGINEER

for E. Boydell & Co. Ltd., of Manchester, manufacturers of "Muir-Hill" earth-moving equipment.

This appointment which is responsible to the Chief Designer offers a young engineer, aged 26 to 30, the opportunity to employ resource, initiative and imagination in a progressive and expanding medium-sized Company. Generous initial salary with excellent promotional and financial prospects, pension and other benefits. Occasional travel will be involved.

Principal responsibilities will be to investigate production problems related to design, discover their cause and put forward solutions. Other duties will include investigation and collation of engineering detail connected with specific development projects. These will entail advising on the use, application and availability of equipment and materials.

Minimum technical qualifications HNC (Mechanical Engineering) with endorsements. Should have experience of hydraulic applications from prime-movers, of transmission systems and of very heavy and light fabrications.

Please write in first instance, quoting reference No. 176, to:

ASHLEY ASSOCIATES LTD.
PETER HOUSE, MANCHESTER 1
retained to advise on this appointment

The strictest confidence will be observed and no details of candidates will be passed to clients without candidates' permission.

E6857

DRAUGHTSMAN / JUNIOR MECHANICAL ENGINEER, preferably with N.C. or H.N.C. Age 25 or over, for Birmingham office of major oil company. Commencing salary approximately £800 per annum. Only applicants with good practical background, capable of working on own initiative, need apply. Box No. E.6837, "The Engineer".

ENTHUSIASTIC YOUNG MAN, 22-26, required by firm of precision engineers with factory situated in the Amersham, Bucks area. H.N.C., some experience of production control. Excellent prospects. Accommodation can be provided. Please reply to Box No. 2473 "The Engineer".

FORENSIC ENGINEERS invite applications from Engineering Graduates with good background and industrial experience for responsible and individualistic post. Age not over 32. Box No. E.6841, "The Engineer".

HIGH VACUUM SYSTEM FOR THE 7GeV PROTON SYNCHROTRON

Scientific and Experimental staff are required at the Atomic Energy Research Establishment, Harwell, to carry out vacuum for particule accelisators and to develop a very large vacuum system:

(*a*) An Honours Graduate for fundamental work in high vacuum system design, involving studies of sorption phenomena and non-stationary flow conditions.

(*b*) Techniques specialists to supervise teams using vacuum apparatus and vessels and to assist in commissioning the final system. Experience is required in (1) design, testing or installation of high vacuum equipment; (2) leak detection techniques; (3) design and calibration of vacuum instruments.

Salary scales according to age, qualifications and experience.

Please send a POST CARD for details to the Group Recruitment Officer (5004/25, U.K.A.E.A., A.E.R.E., Harwell, Didcot, Berks. E.6791

EXPERIENCED ENGINEER, preferably machine tools, age up to 50, for Calcutta branch Office of reputable West End company engineers and agents, Public School or good technical background, excellent prospects. Pension scheme. Only smart men with ability, drive and appreciation Indian culture need apply. Full particulars apply—Box No. 2472. "The Engineer".

INSTRUMENT ENGINEER

A first-class opportunity has arisen for an Engineer experienced in the design of process control instrumentation, to join a major London Oil Refinery and Petro-chemical Engineering Company.

Applications should have at least H.N.C. with suitable endorsements.

Salary up to £1,600 p.a., according to experience. Please write giving full details in confidence to Box No. E6825, "The Engineer".

MANCHESTER CORPORATION TRANSPORT DEPARTMENT
require a fully qualified
TECHNICAL ASSISTANT

Applicants must have passed the Final Examination of the Institution of Mechanical Engineers.

Salary in accordance with the Special Basic grade of the National Scales, i.e. £785—£1070 per annum.

Forms of application may be obtained from the General Manager, 55, Piccadilly, Manchester, 1, and should be returned not later than 1st August, 1959.

MECHANICAL AND ELECTRICAL ENGINEERS
Henry Wiggin & Company Limited,
Holmer Road, Hereford.
require
A QUALIFIED MECHANICAL ENGINEER
and
A QUALIFIED ELECTRICAL ENGINEER
AS ENGINEERING ASSISTANTS

for interesting and varied work, in the first place in connection with their Expansion and Modernisation Scheme at Hereford.

Applicants should be under 40 years of age and possess either an Engineering Degree or Corporate Membership of either the Institution of Mechanical Engineers or the Institution of Electrical Engineers. They should have had a first-class practical training and engineering experience, covering preferably, one or more of the following:

Steelworks Plant and Equipment.
Extrusion Plant and Machinery.
Heavy Hydraulic Equipment.
Rolling Mills and Ancillary Equipment.

Attractive salaries will be paid to the successful applicants.

Excellent Welfare and Canteen facilities will be available and a generous Non-Contributory Retirement Scheme is in operation.

Apply in writing, giving full particulars of education, training and experience, to the Chief Engineer.
HENRY WIGGIN & COMPANY, LIMITED
HOLMER ROAD, HEREFORD.

MECHANICAL ENGINEERS

COURTAULDS LIMITED requires Graduate Mechanical Engineers, aged 25 to 40, for important work in the design, construction and maintenance of large synthetic fibre and chemical plants. Candidates should have a good honours degree in Mechanical Engineering and preference will be given to those who have already completed a suitable apprenticeship and had two or more years' experience in the design or maintenance of industrial plant.

The vacancies are additional permanent appointments with very good opportunities for obtaining a wide experience in the process engineering and contracting fields and prospects of promotion for men with an original approach to problems are excellent. The work is exceptionally varied covering the complete range of engineering activities from heavy industrial equipment, including boiler and power plant, to fine mechanisms and highly specialised machinery of Courtaulds own design.

Successful candidates will be given the necessary background knowledge of the various processes concerned to enable them to further the development of modern manufacturing techniques and automatic control in the industry.

Financial assistance is normally awarded to married men when moving house. The appointments are pensionable and the occupants will be eligible for Co-partnership benefits.

Candidates should write for a detailed form of application to the Director of Personnel, Courtaulds Limited, 16 St. Martin's-le-Grand, London, E.C.1, quoting reference number B.55. E6813

LONG ESTABLISHED LIVERPOOL TECHNICAL CONSULTANTS require Technical Assistant having University Degree or equivalent qualifications in Engineering and Physics, some knowledge of German advantageous but not essential. Unusual and interesting opportunity for applicant with ability to think clearly and logically. State present salary Box No. E.2470 "The Engineer".

ELECTRICAL ENGINEER OR PHYSICIST. University trained, preferably with some practical experience required by professional firm in Liverpool, permanent appointment of unusual interest with good future. State present salary. Box No. E.2469, "The Engineer". E.6834

METHODS ENGINEER, ELECTRICAL required for established Diesel Manufacturing Company in East Anglia. Applicants should be fully qualified Electrical Engineer with first class knowledge of modern electrical equipment and test and procedures. Ability and personality to organise and take full responsibility for test problems and liaison with electrical manufacturers on technical problems is essential. Good salary will be paid to the suitable applicant. Applications in writing, stating age, qualifications and experience to Personnel Manager, Box ME.891, A.K. Advtg. 212a, Shaftesbury Avenue, London, W.C.2. E.6856

MECHANICAL HANDLING Sales Engineer to operate amongst leading Consultants and Industrial Organizations. Experience and Car essential. Write stating age, experience and salary required to Box No. E.2474 "The Engineer".

OPERATING ENGINEERS for high pressure water tube boilers required by well known firm of Boiler Contractors. Applicants must have previous experience and be prepared to travel anywhere in the U.K. and abroad. Minimum qualifications B.O.T. Certificate (Steam). Membership Institute of Marine Engineers or H.N.C. an advantage. Salary commensurate with experience and qualifications. Pension scheme. Apply giving full details of age, previous employment and qualifications in confidence to Box No. E.6851 "The Engineer".

PERSONNEL OFFICER

A large heavy engineering and boilermaking Firm in Glasgow, require a fully experienced Personnel Officer, preferably a time served tradesman, not under 30 years of age, with Knowledge of and experience in dealing with:—

(*a*) Engagement of Labour, all classes.
(*b*) Negotiations with workers representatives.
(*c*) Agreements between Employers Associations and Trade Unions on Wages and conditions.
(*d*) Apprentices progress through Works Departments.
(*e*) Works welfare and safety measures.

Please detail experience and positions held also state age and salary required. Write 2361, Wm. Porteous & Co., Glasgow. E.6840.

POWER RECTIFIER DESIGN

Due to expanding business, a large electrical manufacturing firm in the Midlands requires assistant Design Engineers for rectifier work. Previous rectifier experience not necessary, but applicants should have degree (electrical) or equivalent, and some practical training. Work involves mercury arc and semiconductor rectifiers and application engineering of all kinds with scope for wide experience and interest; good salary and prospects. Pleasant residential area; ample housing; educational facilities excellent.

Apply with full particulars to Box No. E6819, "The Engineer".

SAFETY OFFICER
required by
THE ATOMIC WEAPONS RESEARCH ESTABLISHMENT, ALDERMASTON, BERKSHIRE.

To assist the Industrial Safety Officer with investigation of special engineering problems associated with accidents and inspection of plant and equipment to Statutory Standards. The duties also include working with engineering consultants and professional scientific staff investigating special problems associated with safety of design, and to assist with lecturing and training of personnel.

A recognised engineering apprenticeship is required and Corporate Membership of the Institution of Mechanical or Electrical Engineers or equivalent qualifications. Practical and supervisory experience in workshops, including welding and industrial plant also required. It will be necessary to demonstrate a keen interest in Industrial Safety and capacity to assimilate the legal aspects of this work.

Salary—£845 (at age 25)—£1,150 (at age 34 or over)—£1,315.

Contributory Superannuation Scheme. A house or substantial assistance with house purchase will become available for married officers living beyond daily travelling distance.

POSTCARDS for application forms to the Senior Recruitment Officer at above address. Please quote ref. A.2244/25. E.6835.

RESIDENT MECHANICAL ENGINEERS required to supervise installation of sewage purification machinery, penstocks and diesel power plant at Crossness, Kent. Must be experienced in erection of heavy machinery. Apply giving full particulars, qualifications and previous experience. Probable duration 4 years. Box No. E.6844, "The Engineer".

SENIOR PIPING ENGINEER

required by major engineering company engaged on many large contracts in the Oil, Petrochemical, Chemical and Nuclear fields.

The successful applicant will be aged 35–45, and with at least fifteen years' experience in dealing with pipework problems appertaining to the above industries.

A salary in the region of £2,500 p.a. is envisaged and only engineers with adequate experience and capabilities need apply.

Please write giving full details to:
General Manager, Box No. E6817, "The Engineer".

TRAINING OFFICER

required by the United Kingdom Atomic Energy Authority at Windscale and Calder Works, Sellafield, Seascale, Cumberland, to be responsible to the Training Manager for lecturing on subjects related to engineering and to the functions of the Works within the Group. Duties will range from introductory talks for new staff, to detailed descriptions of engineering techniques for professional engineers.

A recognised engineering apprenticeship and corporate membership of a senior engineering institution, or equivalent, are essential. Experience in teaching or industrial training is desirable.

Salary within scale £845 (at age 25) to £1,315.
Contributory Superannuation. Staff housing scheme.

Send postcard for application form, quoting reference P.2/J1, to Works Secretary, at above address. Closing date: July 20th, 1959. E.6845

VICKERS RESEARCH LIMITED
DESIGN ENGINEERS

Applications are invited for posts in the Engineering Division of the central research organisation of the Vickers Group. There are vacancies for work on novel ELECTRO-MECHANICAL, HYDRAULIC and associated devices. Recruiting will continue over the next few months.

Duties. The design of experimental and prototype equipment in conjunction with the scientific staff of the other divisions and the supervision of the construction of the equipment. It is to be preferred that the Design Engineers take an appropriate part in the experimental work in the laboratories.

Minimum Qualifications. Corporate Membership of a Professional Institution is desirable. A degree in Engineering may be an advantage.

Experience. Complete familiarity with drawing office and workshop practice. It is advantageous to have experience of working liaison with scientists and engineering development for production.

Salaries. Commensurate with experience and qualifications.

The appointments will be to the new research establishment in Sunninghill, near Ascot but appointees may be required to work for some months at the address below to which applications should be made.

VICKERS RESEARCH LIMITED,
BROOKLANDS ROAD,
WEYBRIDGE, SURREY

E.6830

SITUATIONS WANTED

WORKS MANAGER, 34, B.Sc., A.M.I. Mech.E., A.M.I.W.M., seeks change, Management in smaller firm or Assistant in larger firm preferred. Apprenticeship. experience design, tendering, sales, etc. Reliable and adaptable. Box No. E2465, "The Engineer".

NORRIS CONSULTANTS LTD.,

in view of a two-year expansion programme, require for their London and Bristol Offices and elsewhere in the U.K., Senior and Junior Engineers, Designers and Draughtsmen in the following fields.

CIVIL ENGINEERING & SERVICES DIVISION

Reinforced Concrete, Heating, Ventilating, Air Conditioning, Refrigeration, Pipework and General Services, Structural Steelwork, Electrical (Heavy and Light current).

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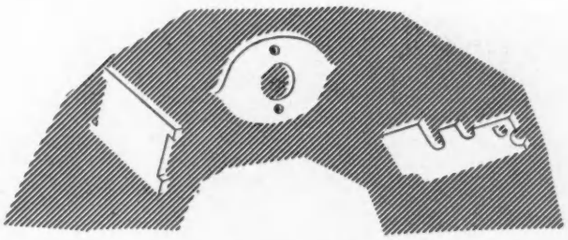

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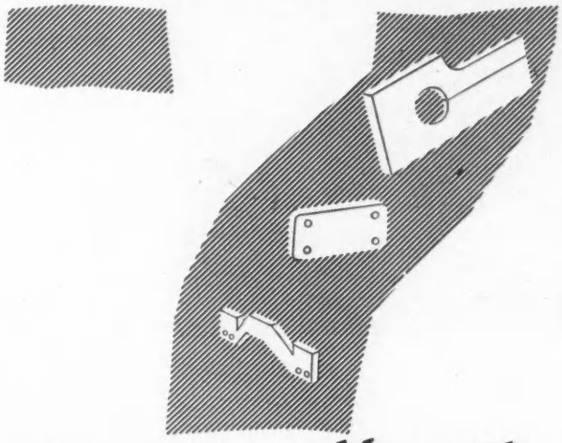

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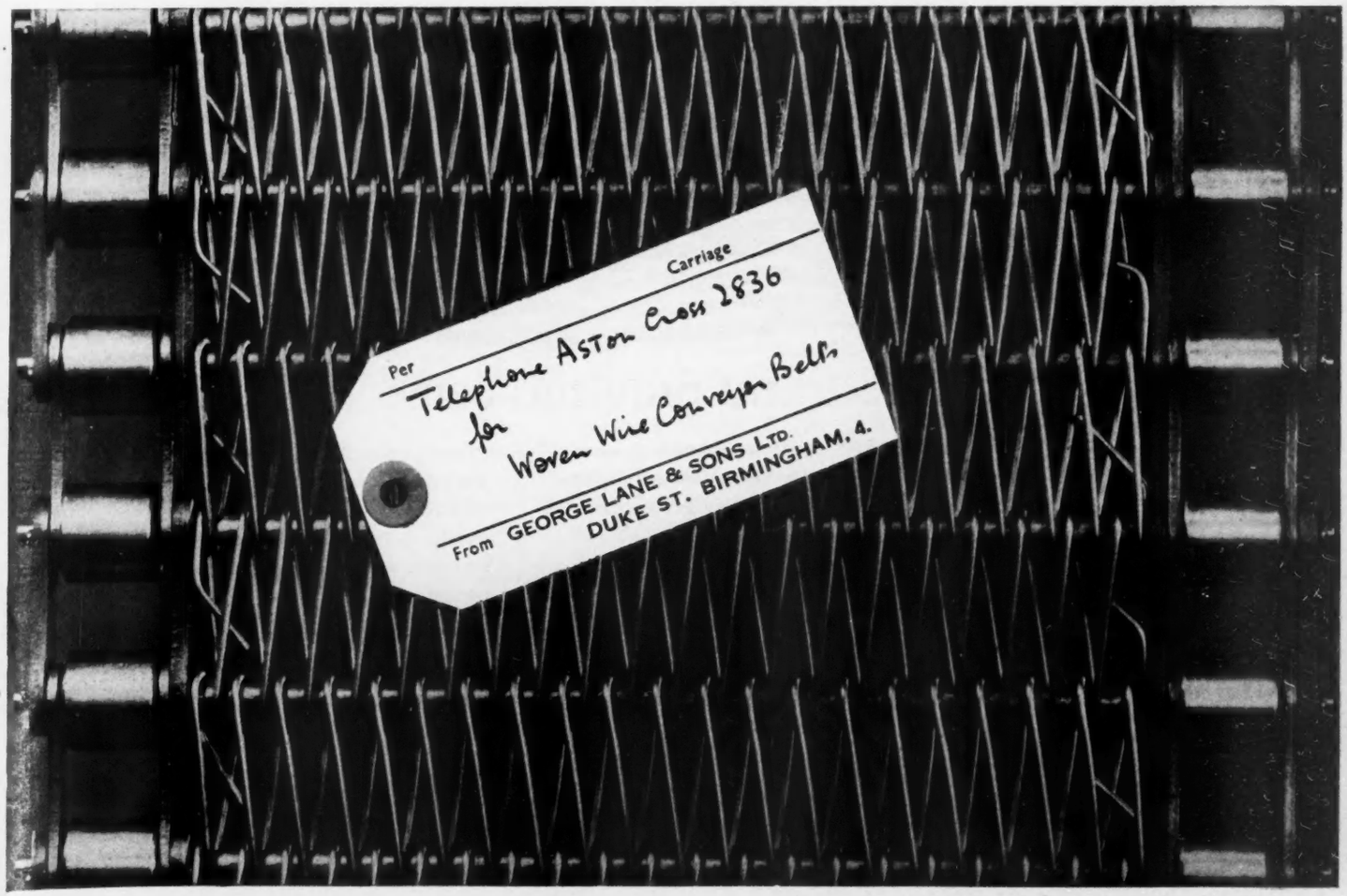

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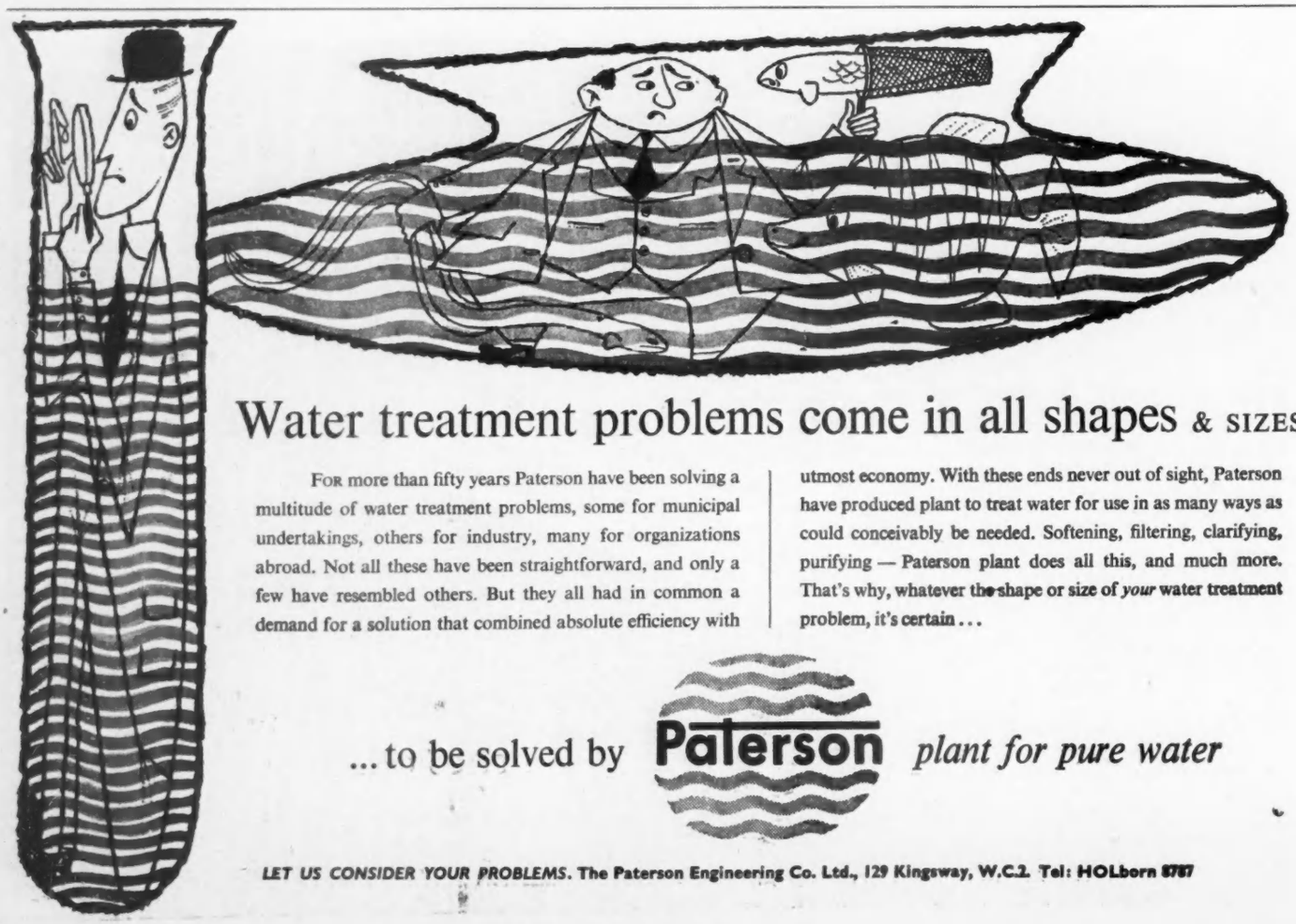

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THE ENGINEER

No. 5398 JULY 10, 1959 VOL. 208

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ACCELERATION

The accelerating pace of technological achievement was graphically illustrated last month at the Guildhall of the City of London when, in the centenary year of the birth of Lord Wakefield of Hythe, G.C.V.O., the inaugural Wakefield Memorial Lecture was delivered to the patrons, staff and students of the College of Aeronautical and Automobile Engineering. Lord Wakefield is remembered as having sponsored many great achievements that set milestones in the progress of, particularly, automobile and aeronautical engineers, but it was not until Sir Charles Cheers Wakefield was fifty that a heavier-than-air craft flew over the English Channel. Forty years ago the first heavier- and lighter-than-air crossings of the Atlantic were made: during the lecture, Mr. P. G. Masefield reported that engineers in the United States were even now preparing to build airliners to carry 100–120 passengers from New York to London in two hours, and anticipating investments of as much as $450,000,000 up to the stage of obtaining F.A.A. certification. While it might well be that a supersonic transport was already under construction in Russia, recent years had seen the United States of America regain the prominence in aeronautics earned for it by the Wright brothers, whereas in the years between the wars Great Britain had actually held the "triple crown" of heavier-than-air achievements, the world's records for speed, altitude and range without refuelling. It was suggested that the publication of patents taken out by Whittle may have contributed to the lead gained by Germany during the war in the application of jet propulsion, and here we wish that Mr. Masefield had entered into more detail, for the excellent study made by Dr. Schlaifer concluded that von Ohain was ignorant of Whittle's patent, while the 1930 British patent followed generally the lines of Guillaume's patent of 1921, of which Whittle in his turn was ignorant.

It was but natural for Mr. Masefield to consider what place Great Britain would hold in the future, and how it could be attained or improved. Equally naturally, he believed that it was essential for an industrial nation of importance to be active in the design and manufacture of aircraft. He did not see good reasons for building an extremely fast transport—on previous occasions Mr. Masefield has given detailed reasons to believe that even the heavily trafficked North Atlantic route would employ only a handful of machines—since there were many other avenues yet to be explored by Britain, such as the minimum-specific-cost machine that would enlarge the market for passenger and freight transport, and the minimum-cost aircraft for general aviation (the 65,000 privately owned aircraft in the United States alone did more flying than the air liners of the whole world).

It is, however, important to realise that a very significant proportion of the decisions that will shape the future of aeronautics in Great Britain have already been taken—for instance, that of British European Airways not to concentrate on the turbo-prop aircraft which they had expected to offer the lowest possible fares. Another highly significant decision was announced a few days earlier by the Minister of Supply, to the effect that the Ministry was buying a small number of Handley Page "Herald" and Avro 748 aircraft with R-R. "Dart" engines for use on internal air services, on the grounds that this will enhance their commercial prospects. While this news has, we understand, been welcomed by aircraft manufacturers, it is difficult to see that it will give much satisfaction to air line operators. The "Herald" twin appears directly competitive with the Fokker/Fairchild F.27 that has the great advantage of being already in service in Europe and America; a British equivalent of the 748, the Aviation Traders "Accountant", has already been designed, flown, canvassed, and abandoned, while the American Grumman "Gulfstream" that is already certificated and coming off a production line could doubtless be stretched from an executive to a feeder liner if a market, in fact, exists. Had one of the nationalised corporations been paid to take the real, but worthwhile, risk involved in adopting such machines as the Saro "Princess" or the Vickers V.C. 7, some very real benefits might have been reaped by this country—at least its communications with the Commonwealth would be less vulnerable, and the Royal Air Force would not be equipped with a collection of second-hand air liners! But to employ the nation's resources merely to divert to this country orders that would otherwise go to others, would be to make a decidedly negative contribution to the confidence and co-operation between nations that is surely a pre-requisite for the successful operation of commercial aviation. Have the "Herald" and the Avro 748 sufficiently distinctive prospective advantages relative to established competitors to justify the intervention by the Ministry? We cannot help feeling the matter should have been left for the commercial market to judge.

THE ROYAL SHOW

This week the Royal Agricultural Society's annual show is being held at Oxford. It began on Tuesday and ends this (Friday) evening. The machinery section of the show does not occupy quite as much space as in some recent years, but it is as comprehensive as ever. The display there presented cannot fail to emphasise to the many thousands of technical and lay visitors how great is the contribution which engineers continue to make to the important business of food production. The educational value of an event like the Royal Show may not always receive the consideration it deserves, though in making a comment of that nature, we in no way belittle the commercial endeavours of the firms who exhibit in the machinery and other trade sections of the show. Without their support, it is doubtful if the "Royal" could be staged at all.

But the Royal Agricultural Society, now in the 121st year of an active and distinguished life, is primarily a learned society. Its endeavours, in all departments of agriculture, are based on its traditional motto "Practice with Science". It has done much to foster the development of all kinds of farm and forestry machinery, particularly by organising competitive trials which in years gone by were a more valuable adjunct to the Royal Show than they are now. This year, it may be noted, however, there are displayed at Oxford various items of forestry machinery which participated in a competition completed by the Society last Autumn. The fuller mechanisation of forestry operations is a subject to which increasing attention is being given by agricultural machinery designers and manufacturers, and the Royal Agricultural Society's encouragement and assistance in this direc-

tion undoubtedly constitute another worthwhile effort. The forestry machinery, of course, is but a small fraction of this year's display at Oxford. Much that is there has been shown before, yet amongst it there are examples of new developments and improvements calculated to increase the efficiency of existing machines. The development of hydrostatic transmission for tractors is one example and the adaptation of several machines to fit them for industrial tasks outside agriculture is another. Then, too, there is evidence that designers and manufacturers are taking careful note of the statutory requirements for the safe operation of farm machinery. These are all matters which support our conclusion that the educational value of the Royal Show is considerable. At the same time, we must step from the "pulpit to the market place" to recall that, in 1957-58, British farmers spent (according to Lord Netherthorpe, President of the National Farmers' Union) more than £212 million on machinery, to which there must be added export sales valued at nearly £100,000,000. The annual product value of the agricultural tractor and machinery makers is thus an impressive one; the record of their technical advance is just as impressive. The Royal Show, we feel, is still an event which helps effectively to illustrate these important factors.

DEFICITS ON THE RAILWAYS

The British Transport Commission controls, of course, a good many other businesses besides railways. It is a very large road operator in the passenger and freight fields; it operates cross-channel shipping services; it has responsibilities for docks and inland waterways; and it runs hotels and catering establishments. But in studying its accounts chief interest is always attracted by the figures for the railways. For the reader seeks the answer to the question, will the railways ever prove able to pay their way? In that sense the accounts for 1958 make reading that is depressing enough! Whereas in all its other activities during 1958 the Commission earned a working surplus of just over £20 million, its railway working expenses exceeded gross receipts by a little more than £48 million. Consequently the Commission's deficit for the year, allowing for central charges, amounted to £89 million. Some £55 million of that sum can be taken to represent the expected deficit under the scheme for deficit working approved by the Government in 1956. A little of the remainder can be ascribed to losses due to the London bus strike. But most must be ascribed to losses of traffic that it was expected the railways would carry—losses of traffic in a year when increased traffic was to be expected as a consequence of modernisation. To what extent it is fair to blame trade recession for the losses and to what extent there would have been losses in any case it is not possible to determine. We feel much sympathy for the Commission. For it must be peculiarly irritating to its members that 1958 should prove a year of trade recession; because, had there been no recession the effects of modernisation might really have begun to show in the accounts. It would have been unreasonable to expect much change, since even by the end of the year modernisation had not really got very far towards influencing the economics of railway operation. But in the event it is quite impossible to assess at all what the effect may have been. There is, however, one encouraging factor to be noted. Despite the recession and despite the closing of certain branch lines, the number of passengers carried did not fall.

Firmer conclusions about the effects of modernisation upon the railway accounts should be derivable from the results of the present year's working. For in 1959 modernisation will really be getting into its stride. Whereas, for example, by the end of 1958 only 103 diesel main line locomotives had come into service, no less than 388 more will be delivered in 1959. There will be such consequences as the complete elimination of steam traction from East Anglia by the year's end and the hauling of a majority of principal expresses northwards out of King's Cross and St. Pancras by diesels. Again, only very recently two big modern freight yards have come into service at Thornton and Temple Mills, allowing forty smaller yards to be shut down. Other big new yards will come into service progressively from now on. Some twenty-seven such schemes are included in the modernisation plan. Concentration has already led to the closing of 270 out of date and misplaced goods depots and yards. In 1959 the mileage covered by fast, continuously braked freight trains will become really significant. By the end of 1958 it amounted to 35 per cent of the whole. The fact that there were 2,400 diesel rail cars in service by the end of 1958 had much to do, it must be supposed, with the satisfactory passenger carrying figure for that year. About 2,000 more are to enter service during the next three years.

Can railways ever prove profitable again in this country? Last year's accounts are of very little use for judging the prospects. They merely show how long a way there is to go. The working deficit for 1958 (not taking central charges into account) amounts to about 10 per cent of the turnover; and if they are to be profitable the railways should surely in the future be able at least to cover working expenses in a slump year. It is true, of course, that in consequence of organisational changes and new freedom to negotiate charges, road haulage operators are beginning to complain of "fierce" competition from the railways. But is it really the "A" licence road haulage operator with whom the railways need to compete? Surely it is the "C" licence operator who is more to be feared. And even in a year of recession the number of "C" licensed vehicles in use continued to increase. In order to quote low charges the railways need to get firms to give them regular roads rather than fluctuating ones. But that is to ask many firms to reverse their practice. For the trend amongst firms is to carry as much as possible on their own vehicles, placing the fluctuating excess on rail or with a road haulage contractor. Certainly the railways are setting out to change the trend by their charging policies. But we cannot help wondering whether the cost of transport is as much a major factor influencing the choice of method as is commonly supposed. The convenience of controlling one's own transport may be proving a more important factor with some firms. Because the value of his work is so high an executive may justifiably regard the cost of his personal transport as a negligible factor; and he, therefore, chooses whatever form will allow him to do the most work most conveniently. Often it will be the relatively expensive private car. We suspect, judging from the rapid increase in the number of "C" licensed vehicles, that some similar factor may rule there. If so, lowered charges by the railways and even improved services may have little more than a marginal effect in attracting new traffics. However, in an expanding economy a marginal improvement might still prove enough to keep the railways out of the red.

Summer School on Corrosion

For the sixth year in succession a week is being devoted to the study of corrosion and the various means of its prevention at the Metallurgy Department of the Battersea College of Technology, London, S.W.11. This quite unusual series of four-day courses was started in 1954 when three lecturers were invited to deal with the fundamental principles of corrosion and its prevention; eighty people attended. The following year, with forty-five people present, seven visiting lecturers spoke on the numerous aspects of the oxidation of metals. In 1956 no less than eight lecturers were invited to address eighty people concerning various aspects of water treatment. The following year there were again eight visiting lecturers when fifty people attended to hear about corrosion testing and research methods. Last year still another eight lecturers spoke to an attendance of eighty at a course on underground corrosion and cathodic protection.

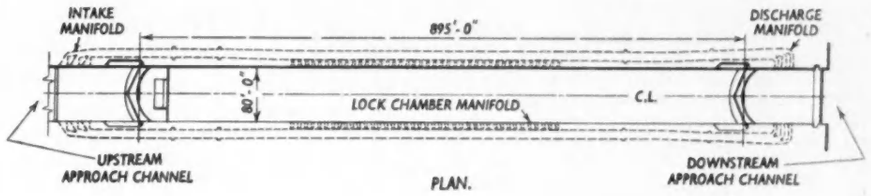
These previous courses have set an admirable example and it is to be expected that the course now being planned for this year will maintain the enviable tradition which has been built up by the persistent and enthusiastic work of the head of the department, Mr. L. W. Derry, and Dr. L. L. Shreir at Battersea. This year's lectures will deal with newer materials, metallic and non-metallic, for resistance to aqueous and high temperature corrosion, and they are arranged to take place about two months later in the year than on the earlier occasions; from September 29 until October 2, 1959. The topics included are of special interest to engineers, namely design in corrosion, nickel alloys, stainless steels, titanium, zirconium, tantalum, precious metals, plastics and coatings of plastics, fibre glass, paints and so on.

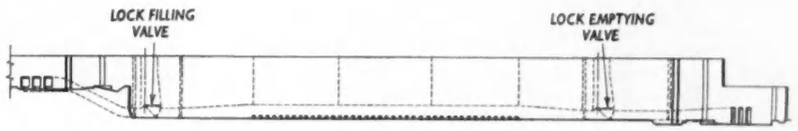
More especially this course should be of help to those engineers, metallurgists, chemical engineers and corrosionists who wish to obtain up-to-date information of developments at first hand from experts in these fields. The fee for the course, including lunch and refreshments, is twelve guineas and application to attend should be addressed to the Secretary (Summer School) Battersea College of Technology, Battersea Park Road, London, S.W.11.

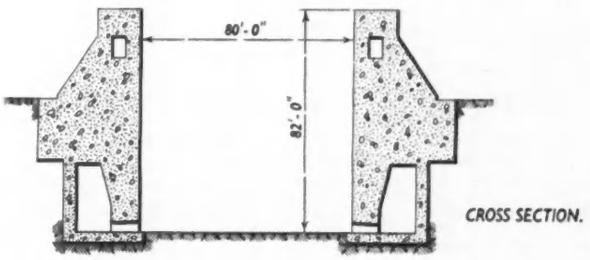
St. Lawrence River Development

VII—The Beauharnois Locks

In this week's instalment, we return to the Seaway itself, and describe the Soulanges and Lake St. Francis sections. The former involved principally the construction of two locks beside Beauharnois power station, but the latter only dredging. Together, these two sections extend over 45 miles, and bring our description to the end of the purely Canadian length of the St. Lawrence Seaway. The filling and emptying system is outlined in the drawings on the right (Fig. 26).







THE two locks giving access from Lake St. Louis to the Beauharnois power canal, together with all the various ancillary works for the Seaway at this site, have cost nearly 60,000,000 dollars to construct. The work was characterised by (*a*) a constructional programme demanding high rates of progress; (*b*) excavation of large quantities of a highly-abrasive sandstone rock and (*c*) a problem of seepage and ground water control in the area near the power canal.

The general plan (Fig. 23) published with No. VI last week, showed the two locks and the intermediate basin between them. "Twin-flight" locks and a single high-lift lock were also considered at the design stage, but proved less favourable than the arrangement shown. The high-lift lock, incidentally, would have consumed about twice as much water per cycle as the two separate locks, which is equivalent to a loss of 4000kWh at the power plant per locking cycle. For a description of the general design features of these two locks, and their operating machinery, reference should be made to No. III of this series. Some further information, however, to amplify the details already published, is given under the next two headings. It relates to the hydraulic characteristics of the Beauharnois locks, and is reproduced from a paper‡ by Mr. D. McIntyre, the senior assistant hydraulic engineer of the Seaway Authority.

Filling and Emptying Systems

The general arrangement of the filling and emptying system is indicated in the drawing above. Wall culverts are 12ft wide by 14ft high at the filling and emptying valves expanding to a cross sectional area of 305·5 square feet between valves.

Nearly all excavation had to be made in a very hard and abrasive sandstone, so lock walls were kept as thin as possible, and wall culverts in their enlarged section were made as high and narrow as practicable. Inner walls between the culverts and lock chamber had to be designed similar to a haunched beam section with a thickness of 10ft at the lock floor and 14ft at the tops of the culverts. Outer culvert walls are in the form of concrete slabs anchored to excavated rock walls. The enlarged culvert sections are 25ft high with a top width of 9ft 6in and a width of 13ft 6in in their lower 9ft of height. Lock chamber ports, being located at lock floor level, are 10ft long.

Because of their relatively short length, ports were designed with a narrow throat section to control the direction of jets issuing into the lock chamber. It was decided to use forty small ports on each side of the chamber. Port throats are 3ft 6in high by 1ft 3½in wide, giving a total throat area of 180·8 square feet in each lock wall. A spacing of 10ft 1½in was used for ports in order to fit them into a lock wall with monolith joints 40ft 6in apart.

Information gained from hydraulic models for Canadian Seaway locks indicated improvements in lock performance as follows:

1. Enlargement of the wall culverts between filling and emptying valves. This decreased flow velocities past the ports, greatly improved flow distribution through the ports, and hence reduced surge in the lock chamber and filling and emptying times.

2. Unsymmetrical venturi-shaped ports. Tests made with symmetrical ports indicated that the direction of efflux was

Fig. 27—First filling of the Beauharnois lock shown in progress, looking downstream

‡ "The Beauharnois Canal Locks," by D. McIntyre. *American Society of Civil Engineers Proceedings*, Vol. 84, No. WW4, Paper No. 1871, September, 1958.

influenced by flow in the culverts, giving a downstream flow along the floor of the lock. A compensating upstream flow along the surface of water in the chamber exerted upstream force on a ship in the lock. In addition it was found that a surge was set up in the lock chamber due to a shift in the distribution of port discharge during a filling. Inertia of water in the culverts caused a high rate of discharge from upstream ports at the beginning, but as velocities in the culverts increased, flow from downstream ports built up rapidly while that from upstream ports fell off. This caused a ship in the lock to be forced first downstream then upstream.

Circulation in the lock chamber and the shift in port discharge distribution were counteracted by the use of unsymmetrical ports to direct flow from upstream ports in the downstream direction, and that from remaining ports in the upstream direction. In this way, discharge from all ports tended to be concentrated in the mid-section of the lock chamber, and to flow in both directions toward the ends of the lock.

3. Centre of gravity of the ports shifted upstream from the mid-length of the lock. It was found that discharge from downstream ports was greater than that from upstream ports during the greater part of a filling operation. This unbalance of flow was reduced, but not entirely eliminated, by the use of enlarged culverts. By shifting the port arrangement some 20ft to 30ft upstream from a centred position in the lock chamber, port inflow was balanced about the lateral centre line of the lock (see Fig. 27).

The unsymmetrical ports have one side perpendicular to the lock centre line while the other side is flared. In the Beauharnois lock model, best results were obtained with the twelve upstream ports in each chamber wall flared downstream, while all remaining ports are flared upstream. Shifting the port arrangement nearly 23ft upstream from a centred position in the lock was found to give satisfactory results in the model.

From model test results it is estimated that the locks, under average lift conditions, can be filled in 6 minutes and emptied in 7·3 minutes, but local turbulence in the lock chamber may make it difficult to control a smaller vessel at maximum filling rates. A filling time of about 7·5 minutes should be suitable for vessels of all types.

Regulating Works for the Channel Between Locks

The intermediate channel has a surface area of little more than 26 acres, so that a single lockage operation could change the water level by more than 2·5ft. Calculations were first made to determine the height of surge which might be caused in the channel by emptying the upper lock, filling the lower lock, or by both of these operations made simultaneously. There was little danger that a surge height of more than about 2ft could be built up. Thoeretical studies of possible lockage sequence, both for single and double locks, and their effect on water level in the channel between locks showed that a maximum regulating inflow of 85 cusecs would be required to maintain a safe depth for navigation. Partly as a safety measure, and partly to compensate for losses such as seepage and leakage through lock gates and valves, it was decided that the supply works should have a minimum capacity of approximately 1000 cusecs. Preliminary consideration was given to a scheme for taking this water from the power canal adjacent to the navigation channel. The scheme was abandoned, however, because of very poor subsurface conditions in this area.

The supply system, as shown in Fig. 28, consists of an intake manifold with ten ports in the upstream south approach wall of the upper lock, a conduit along the south side of the lock, and a discharge manifold with fifteen ports in the channel wall below the lock. The conduit is built into the lock approach walls, but for structural reasons could not be fitted into the walls of the lock itself. Flow is regulated by sector valves near the upstream end. Intake and discharge manifolds are well away from the ends of the lock to prevent interference with ships.

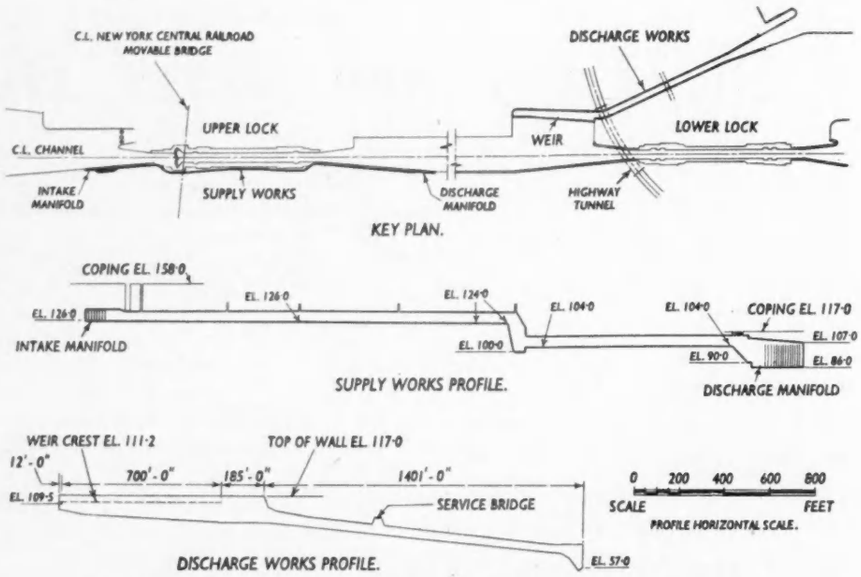


Fig. 28—Details of regulating works for the channel between locks at Beauharnois

Discharge manifold design was made with particular care to prevent the setting up of cross currents in the navigation channel. The ports are 20ft high, to distribute flow over a large proportion of the channel depth, and have a throat width of only 8·4in, so that jets issuing into the channel will be diffused within a few feet of the channel wall. Design calculations indicate a maximum port exit velocity of 4·2ft per second when the total regulating flow is 1000 cusecs.

TABLE XI—*Principal Levels at the Beauharnois Locks*

	Above sea level, ft
Power canal :	
Maximum water level	154·9
Minimum water level	145·4
Invert level of navigation channel	119·0
Upper lock :	
Cope level	158·0
Upper sill level	115·0
Lower sill level	76·0
Intermediate basin :	
Controlled water level	110·0 ±2
Cope level	117·0
Invert level	76·0
Crest level of weir	111·2
Lower lock :	
Cope level	117·0
Upper sill level	74·0
Lower sill level	35·0
Lower lock approach channel :	
Cope level	79·0
Invert level	38·0
Maximum water level	75·8
Minimum water level	65·0

To reduce excavation costs, the conduit between the intake manifold and the lower end of the lock is placed at rock surface level. This upper section of conduit discharges into a drop structure from which flow enters a second section of conduit located below lower coping level. Design of the upper conduit section was complicated by the fact that water level in the power canal fluctuates over a range of nearly 10ft, and maximum regulating flow is required when water level and, therefore, discharge head, is at a minimum. In order to simplify the design of the drop structure and lower section of culvert as well as the discharge manifold, it was necessary to make the conduit head-discharge curve as flat as possible. Pressures in the upper conduit had to be kept as low as possible to minimise leakage into the fill behind the lock wall monoliths.

In the final design an attempt was made to satisfy all of the above-mentioned requirements as nearly as possible. The upstream 756ft of conduit is 7ft high by 9ft wide, with zero slope. At the downstream end of this section there is a sudden expansion to a section 8·5ft by 10ft in area. This larger conduit extends downstream to the drop structure, a distance of 913ft, has a slope of 0·262 per cent, and is designed to carry 900 cusecs when flowing to a depth of 9ft. V-shaped baffles, extending 1ft downward from the roof, are designed to retard flow when the discharge exceeds 900 cusecs.

The drop structure has a length of 70ft, its floor being 24ft below the invert of the upstream conduit and 4ft below the floor of the exit conduit. The depth below floor level of the exit conduit is to be drained, when necessary, through a 6in pipe leading to the face of the lock approach channel wall. Dimensions of the drop structure are such that it provides a free water surface at all times for the release of entrained air.

The exit conduit, 906ft in length, is 8ft wide by 9ft high with zero slope, and curves into the approach wall just below the lock. Flow from this conduit passes through a transition section 82ft long into the discharge manifold which has a total length of 240ft. Energy in high-velocity flow from the conduit is dissipated in a hydraulic jump in the transition, which ends 51ft upstream from the first discharge port to prevent turbulence due to the jump interfering with port discharge.

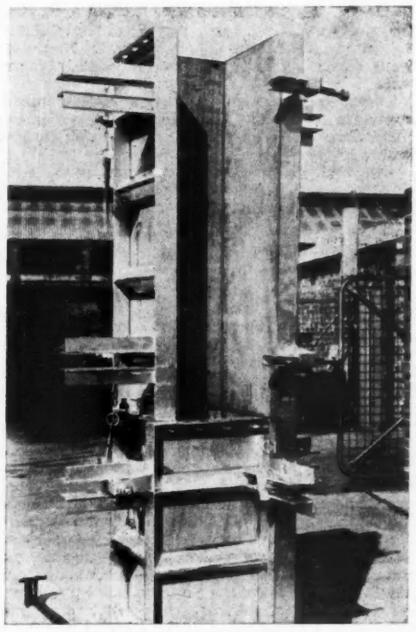
As previously mentioned, the discharge manifold has fifteen ports which are spaced 12ft apart. The upstream 71ft of conduit in the manifold, beginning 51ft upstream from the first port and ending opposite the fifth port, has a uniform width of 10ft. Transitions located between the fifth and sixth ports and between the tenth and eleventh ports, reduce conduit width to 8ft and 6ft respectively. Height of the conduit is 25ft at its upstream end and 25ft at its downstream end, the roof being sloped longitudinally to prevent air being trapped as the water level in the navigation channel rises.

Design calculations for the supply system indicate a minimum discharge capacity of 950 cusecs with a head of 14·4ft on the intake ports, and a maximum capacity of 1250 cusecs corresponding to a head of 23·9ft. With a discharge of 1250 cusecs maximum hydraulic grade line elevation for the section of conduit located behind lock wall monoliths will be 5ft above the roof of the conduit.

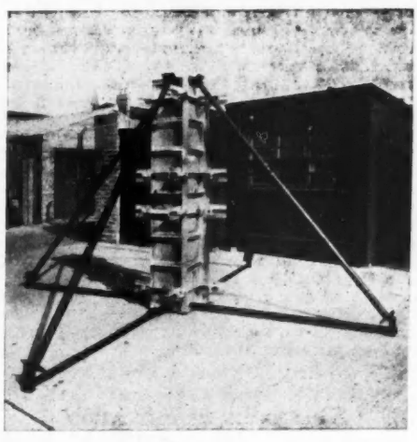
(*To be continued*)

Adjustable Formwork for Columns

A formwork system for square columns has been introduced by Kwikform Ltd., 66 Victoria Street, London, S.W.1. The principal aims in designing the system were threefold namely, an infinite range of adjustment for side lengths from 6 in. to 2 ft. 6 in. speedy erection, and self-bracing of the column forms when erected.



The method of erecting the formwork panels, and the fastening details at the corners and between the upper and lower panels are shown here



Completed column formwork, two panels high, with tubular bracing rods in position

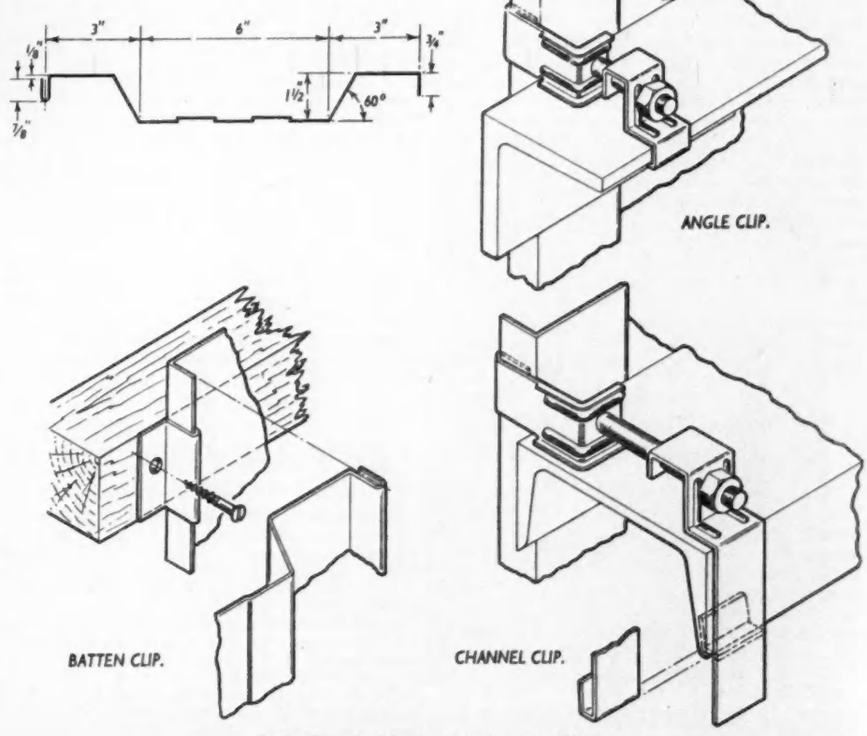
The system comprises panels which are plywood faced and stiffened by light steel members. A panel is 3 ft. or 4 ft. in height, and may be 1 ft. 4 in., 2 ft. 0 in., or 2 ft. 8 in. in width. When erected, each one butts against the adjoining panel which thus "overlaps", as shown in the first illustration, so that a rectangle of any given size within the range is enclosed by four panels. The fastening at the corners is quite clearly shown in this illustration. The "leading edge" of the panel (i.e. the edge which butts against the face of the next one) has two slotted angle irons fixed at right angles to it. A bolt, enclosed by a U-shaped guide plate, extends from the next panel between these channels; the bolt has a tee-headed end which can be turned to bear against the two channels. When erecting, a wedge is inserted in the appropriate slot in the channel, against the U-plate. The position of the panel is then adjusted by tapping the wedge with a hammer; when it is in position, the bolt is tightened. The upper and lower edge frames of each panel have oval holes in them, and the joints here are made by inserting bolts, which have heads of corresponding oval shape, so that the head is simply inserted from the top, and turned through 90 deg. These operations are all quick and simple to carry out.

The method of bracing a completed column assembly is clearly shown in the second illustration; this particular example shows an 8-ft. column ready to receive concrete. The tubes at ground level are attached to the formwork by a spigot, which engages in the oval hole in the edge frame of the panel. At the outer end of each of these tubes, there is a hinged spigot, over which the base of the inclined tube is fitted; then the screw adjustments of the inclined tubes are used to plumb the form and hold it in position.

Light Alloy Cladding Panels for Large Buildings

Light-alloy wall panels with concealed jointing and designed primarily for large industrial buildings, have been introduced by the British Aluminium Company under the name of "Rigidal Seamwall". The panels are 1 ft. 0 in. wide, and may be up to about 40 ft. in length, and they have been given a cross-sectional shape which imparts a bold light and shade effect to the finished wall, on the scale which a large building demands.

The accompaning diagrams show the sectional shape of the wall panels, and three alternative methods of fixing them—to angles, channels, and timber battens respectively. The double upstand or "overcloak" end of the panel contains a caulking compound. A light-alloy clip is placed over the single upstand or "undercloak", as shown in the diagrams, and the fastening completed as shown, with appropriate protective coating of the steel elements to prevent bi-metallic corrosion. The joint itself is completed by a series of dimples made along the seam by a special button punch.



Light alloy cladding panel for large buildings

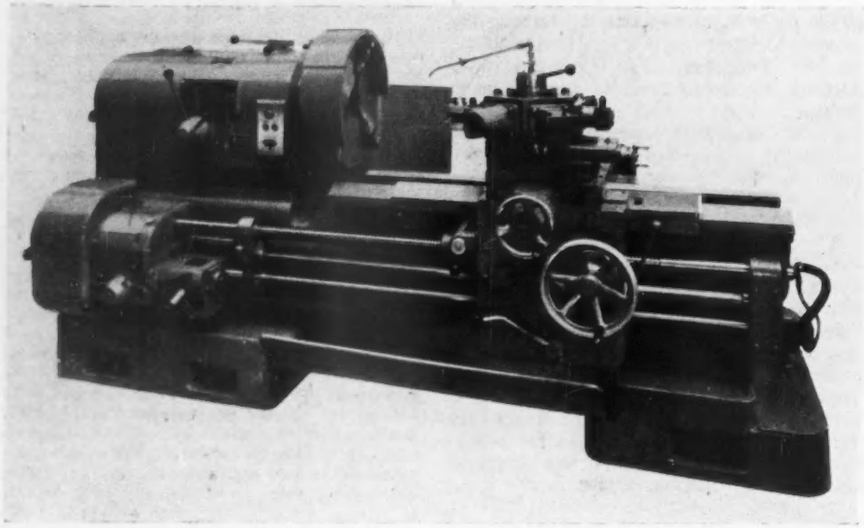
High-Speed Computer Development

THE National Research Development Corporation has announced its decision to support two British manufacturers—Ferranti, Ltd., and E.M.I. Electronics, Ltd.—in further development of advanced high-speed computers. E.M.I. has been collaborating with N.R.D.C. for the past four years in the development of large business computing systems. This collaboration has resulted in the development of the "EMIDEC" 2400 high-speed commercial data processing systems, the various units of which are already being manufactured and commissioned. The further programme is aimed at the development of the "EMIDEC" 2400 computing unit to produce a system—"EMIDEC" 3400—suitable for large-scale, high-speed scientific work.

Ferranti, Ltd., has been developing the techniques initiated at Manchester University by the group led by Professor F. C. Williams and Dr. T. Kilburn for the past ten years, and in this work has been partly supported by N.R.D.C. Experience gained from the operation of Ferranti computers in the field has shown the need for a new very powerful high-speed computer, to be known as "Atlas," which will be widely used in scientific research and development establishments and for fast commercial and scientific data processing.

Launch of R.M.S. "Windsor Castle"

On June 23 the Union-Castle liner "Windsor Castle" was launched from the yard of Cammell Laird and Co. (Shipbuilders and Engineers) Ltd., the ship being named by Her Majesty Queen Elizabeth the Queen Mother. The ship has a length overall of 783 ft. and a beam of 92 ft. and accommodation for 250 first class and 600 tourist class passengers. There is 623,000 cubic feet of cargo space and the seven holds will be equipped with push button controlled power-operated hatch covers. Propulsion will be by a twin screw arrangement of Parnetrada designed geared turbines developing 45,000 service s.h.p. to give the ship a speed of 23 knots and enable the Southampton to Cape Town run to be made in eleven and one half days. Babcock and Wilcox boilers supply the necessary steam. Electrical requirements will be met by six generators of 7,500 kW. total power. The liner, which will be equipped with Denny-Brown stabilisers and is expected to sail on her maiden voyage on August 18, 1960, is the third of the company's ships to bear the name, the first being a ship of 2,672 tons built in 1872 and the second ship of 18,967 tons was built in 1921 and sunk during the war.



Heavy duty lathe to swing 25in over the bed and taking work up to 3ft long

Heavy Duty Lathe

A HEAVY-DUTY, high-speed, surfacing and boring lathe with a swing of 25in over the bed is now made by Denhams Engineering Company, Ltd., Halifax. Depending upon the duty required the main drive can be from motors of 10 h.p. up to 20 h.p. and for a dual spindle speed range with motors of 15/7½ h.p. or 20/10 h.p. Alternative spindle speed ranges available vary from 1000-30 to 500-15 r.p.m. an eighteen-speed headstock being fitted. The longitudinal feeds range from 0·125in to 0·002in per spindle revolution and the surfacing feeds from 0·062in to 0·001in per revolution.

As can be seen from our illustration a hexagon turret is fitted to the machine, and with an 8ft 6in long bed work up to 3ft long is admitted between the chuck face and the turret.

The apron incorporates a spring-loaded worm to provide overload release in both directions of feed and through which longitudinal automatic trip stops can be operated. Control of the headstock clutch is provided by a lever at the right-hand side of the apron in addition to the headstock position, whilst electric push-button control of the main motor and suds pump is built into the headstock casting.

The lathe is fitted with a special saddle and a wide cross-slide having a retention plate to provide additional support when using long boring bars. A 360 deg. swivelling compound slide mounts the heavy duty hexagon turret which has accurate plunger location for its six positions and a dead stop is fitted on the cross-slide to centralise the turret for drilling operations. If required the machine can be supplied with a gap bed to swing 38½in diameter by 12in width in front of a faceplate ; a screwcutting motion to the carriage with a range of two to eighty threads per inch ; six position automatic trip stops to the longitudinal feeds ; four-way dead stops for cross-traverse ; a power-operated swivelling top-slide ; a taper turning attachment ; and a hydraulic copying attachment.

Landscape Treatment on the London/Birmingham Motorway

THE committee appointed by the Minister of Transport and Civil Aviation to advise on the scenic treatment of motorways was not able to study the London–Birmingham scheme before construction got under way and consequently this aspect of the scheme has been rather criticised. Progress of this important scheme was commented upon, it will be recalled, in a "leader" in THE ENGINEER of June 12 last. The committee has, however, made recommendations to the Minister, which are reported in the Ministry's press notice in the following manner.

"A large part of the problem lies in the size of the road which, the Committee recognises, so far transcends the accustomed scale as to dwarf nature itself. Because of this, any special planting except on the very boldest scale would be reduced to triviality.

"For long stretches the road sweeps through unspoilt country and the committee recommend that no planting whatever should be done to interrupt the wide views which the road opens up to travellers. Special planting should be concentrated, for the start at least, at particular points where it is obviously needed, either to emphasise a pleasing prospect or to screen an unpleasing one. In scale with the surroundings the planting must take the form of groups or groves of forest trees ; forest trees should also be used as a screen for the service areas.

"The committee has recommended that as a general rule the cuttings and embankments should be initially grassed and left to regenerate naturally, but they are concerned at the heavy appearance of the bridges spanning the roadway and recommend planting on the adjacent embankments and cuttings to soften their effect. They also recommend that the central reserve should be grassed but not otherwise planted save where an anti-dazzle screen is necessary.

"Planting plans for individual sites on the road, following these general principles, will now be prepared in collaboration with the consulting engineers, Sir Owen Williams and Partners, for the committee to consider in detail before the autumn planting season. The committee will make a further study, after the road has been completed, of the extent to which further planting may be required.

"The line of route of this motorway had been settled before the committee was appointed. The committee appreciates that the Ministry must reduce inroads upon agricultural land and other private property to the minimum, but it commented that although additional land would have had to be taken it would have been desirable to introduce some variation by separating the carriageways more widely at a few points."

A.E.I. Reorganisation at Home and Abroad

Lord Chandos, Chairman of Associated Electrical Industries, Ltd., has announced changes in the A.E.I. selling organisation at home and abroad, and the formation of nine product divisions. Until recently A.E.I. traded solely through its many subsidiary companies, including the British Thomson-Houston Co. Ltd., Metropolitan-Vickers Electrical Co., Ltd., and Siemens Edison Swan Ltd. On July 1, 1958, A.E.I. began trading in its own name through the first two product divisions to be formed. Now (from July 1, 1959) the following nine divisions are in operation: turbine-generator, heavy plant, motor and control gear, switchgear, transformer, electronic apparatus, traction, S.E.S. cables, S.E.S. telecommunications. Further product divisions of the company will be formed shortly. There is now a single export organisation, Associated Electrical Industries Ltd., which has taken over from the export companies of British Thomson-Houston, Metropolitan-Vickers and Siemens Edison Swan; the new company is responsible for the selling organisation of these companies and the product divisions.

Nine area managers have been appointed for the export company, including two to deal solely with the products of Siemens Edison Swan. They are; European Area, W. C. Scott; Middle East Area, E. C. Whiteley; African Area, A. W. Barford; Eastern Area, W. A. Hardman; Australasian and New Zealand Area, P. J. Tyrrell; North American Area, F. C. Gray; Latin American and Caribbean Area, C. H. de Nordwall; S.E.S. Eastern Area, P. R. Watson; S.E.S. Western Area, T. S. Sprake.

Consequent on the formation of the export company new A.E.I. companies are being formed in Canada, New Zealand, South Africa, Central Africa and Brazil.

At home, twenty-three district offices are in operation and seven regional managers, each responsible for a number of offices, have been appointed.

Tehran Nuclear Centre

TEHRAN NUCLEAR CENTRE.—Speaking at the opening of the Tehran Nuclear Centre on June 22, Sir John Cockroft said that the Harwell establishment of the United Kingdom Atomic Energy Authority would be acting as a parent establishment to the Nuclear Centre by providing British staff and by helping with the rapid supply of equipment. In addition there would be rapid communication of ideas and results.

In countries that had ample supplies of low cost fuels, such as oil, nuclear power was unlikely to be attractive for at least twenty years, said Sir John, except in areas far from the source of fuel; the immediate benefit was likely to come from the use of radioactive isotopes. The first and well-tried application was to the diagnosis and treatment of disease, and most large hospitals in Great Britain had radioisotope clinics for such purposes. Sir John pointed out that the Baghdad Pact Nuclear Centre had been able to help in the foundation of a radioisotope clinic in the Baghdad hospital and was helping the University of Shiraz to instal a 1,000 curie radioactive caesium source for the treatment of cancer.

Another class of applications was to industry and agriculture. For example in oil prospecting it was useful to know the density of strata and the hydrogen content when a borehole was being drilled and those quantities could now be determined with radioactive gauges made industrially in Great Britain with the help of Harwell who did the basic work. Also it had been demonstrated in Kuwait that the level of the interface between brine and oil in a borehole could be determined by lowering a neutron source down the hole and measuring the induced radiation.

Expressing the hope that the spread of information would be a two-way process, Sir John said that already an Iraqi student attached for training at Harwell had been able to develop a radioisotopic method for measuring impurities, such as sulphur and lead, in oils and this method was likely to find important applications.

In agricultural research the staff of the Tehran Nuclear Centre had begun experiments to study the migration of the soum fly pest by releasing insects sprayed with radioactive tracers.

Electronics in Education

Technical colleges throughout the country have been notified that because of the increasing importance of electronics, it is desirable that courses of study leading to Ordinary National Certificates in electrical engineering should contain more electronics, if necessary at the expense of machines. A letter to the colleges from the Joint Committee for the Award of National Certificates and Diplomas in Electrical Engineering points out that the older syllabuses at some colleges reflect the predominance which power engineering enjoyed at the time the syllabuses were compiled. Critics have suggested that such syllabuses may be inappropriate today, particularly with regard to the detailed study of direct-current machines, which often constitutes so large a part of the courses. The joint committee feels this criticism is particularly valid in those cases where such courses would normally be followed by studies for the Higher National Certificates with specialisation in the electronics field. The sort of syllabus likely to be acceptable to the committee would be one in which about 80 per cent of the total electrical content of the final year's study consisted of general electrical theory, machines and electronics. The remaining 20 per cent could be either machines or electronics or a combination of both, depending on the requirements of the Higher National

U.S.A. Rural Electrification Administration Controversy

BY OUR AMERICAN EDITOR

On May 11, the Rural Electrification Administration began its twenty-fifth year with a record unsurpassed by any other governmental lending agency and enveloped in a controversy as violent as any ever faced by a similar institution. For the most part, this controversy is political and crosses political lines. The R.E.A. was born of the depression along with a host of other Federal farm aids. It was created on May 11, 1935, by Executive Order of President Franklin D. Roosevelt. The Rural Electrification Act of 1936 gave R.E.A. permanent status and authorised a ten-year electrification loan programme. This programme was extended indefinitely by Congress in 1944. When R.E.A. was born, only 10·9 per cent of all farms in the United States had electric service. It estimates that of the farms recorded in the 1954 census, 4,500,000 or nearly 96 per cent were electrified by last year. More than half of these farms get electricity from R.E.A. systems. Ninety-three per cent of R.E.A. electrification loans have been made to rural electric co-operatives, which are non-profit organisations formed by farmers. As of the beginning of this year, the R.E.A. had approved more than 3847 million dollars in loans to 1082 borrowers. On the same date, the R.E.A. systems were operating more than 1,400,000 miles of electric lines and serving 4,600,000 consumers in forty-six states, Puerto Rico and the Virgin Islands. The R.E.A. considers its "typical electric system" to be a rural co-operative serving 3640 consumers over 1300 miles of line. It obtained its first loan from R.E.A. in 1937 and has borrowed a total of 2,900,000 dollars from the Government. It has repaid approximately 500,000 dollars of its obligation. The interest rate on loans is 2 per cent. This rate, far more than the unsuccessful Democratic effort to strip the Secretary of Agriculture of his authority over loans, is the key issue in the present conflict.

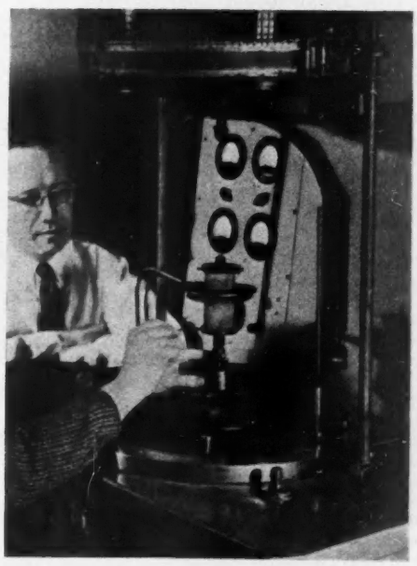
The R.E.A. figures show that the farm use of electricity from the lines it has financed increased from a monthly average of 134kWh per farm in 1949 to an estimated 313kWh last year. The average price paid by residential consumers is 2·68 cents per kilowatt-hour, the lowest rate in R.E.A. history. The steady growth of electric power on the farm has hastened the technological and scientific revolution that has helped produce the abundant surplus that now plagues the Government. There are about 400 new uses for electricity on the farm, and about 250 of these make farming more profitable or increase production. More electric energy is being used for farm chores than was expected when many of the original lines were constructed. A problem facing the power distributors is that of replacing old lines with heavier lines and rebuilding substations to handle the increased loads and keep abreast of demands. In recent years the major activity of most R.E.A. borrowers has been system improvement. The current rate of addition is more than 120,000 new customers a year. Power sales have increased from 2100 million kWh in 1945, when a post-war boom started, to 20,700 million kWh to-day. The R.E.A.s, as the rural co-ops are known, had gross revenues of 563,000,000 dollars last year and a net worth of 512,000,000 dollars. All of these growth figures point up the issue involved in the current fight. The Administration, teetering on a balanced budget, believes that the R.E.A's have "grown up," that in their maturity they should stand on their own fiscal feet with less reliance on the Government and thereby help promote national fiscal responsibility. The Administration wants the R.E.A's to pay at least the Government's cost of money of about 4 per cent. In addition, there is a strong belief among many Republican business men that the Government has gone too far in carrying out its commitments to the R.E.A., that their time has run out and that they should now compete "with private business in the money market and for business."

It has been estimated that perhaps as many as one-third of the rural electric co-operatives would "go to the wall" if they were forced into the commercial money market with interest rates of 4½ to 6½ per cent. This fear was expressed during the present preliminaries. Certain interests want the Government out of the power business, and attacks upon R.E.A. have been as violent as those upon the Tennessee Valley Authority. On the other hand, extreme R.E.A. proponents would like to see a national grid of R.E.A. systems, a network that would form a public power bloc of tremendous political and economic potential. But the R.E.A. is a "pet" of Congress. It is one outstanding farm programme all farm interests in Congress can point to with pride. It also is a potent, if little recognised, political force. Rural electric co-op officers and directors are leaders in their own areas. They are banded together in the National Association of Rural Electric Co-operatives, which maintains a handsome headquarters in Washington and has a powerful and fiery lobbyist in Clyde T. Ellis, its executive director, who sees "Wall Street bankers" trying to grab every rural substation. Mr. Ellis has been restrained on some occasions by his own board of directors. Across the country, many local rural co-operative leaders do not hold with Mr. Ellis that the Administration, backed by the big private utility magnates, is out to turn R.E.A. out of Government and put farm interests at the mercy of big business. Nevertheless, it is a handy tool for all kinds of political aspirants to use because it has cut deep into the farm country with its undisputed benefits and comforts. The bill to strip the Secretary of Agriculture of authority over R.E.A. loans and allot to him mere housekeeping functions over an agency in his own department was aimed at embarrassing the Secretary—who long has been the Democrat's big farm political weapon—and the Administration. It was peripheral in the R.E.A. fight but served to raise tempers and enable the Democrats to focus its political aim. There is more than mere speculation in the idea that some Democrats were looking ahead to the presidential elections of 1960, and political observers read some significance into the fact that Senator Hubert H. Humphrey of Minnesota sponsored the bill with the strong support of other Democratic presidential contenders. The R.E.A's strength spreads across the country, and it is especially strong in the Midwest.

So far, the Secretary of Agriculture has not rejected any R.E.A. loans. But potential borrowers apparently feared that he would. Last year and this, the National Rural Electric Co-operative Association asked Congress to restore final authority over R.E.A. loans to the R.E.A. administrator so as to protect the loans from "political interference." Bills to do that were among the first introduced in Congress this year. At the same time Democratic leaders brushed aside the President's request for higher R.E.A. interest rates. The bills that were introduced might have passed just on the momentum generated by the rural electric groups. But the legislation also served as a rallying point for Democrats seeking to strike at the Administration and provided an opportunity for them to test their strength against the President. So the R.E.A. legislation went through swiftly, approved in the Senate on April 8 by sixty to twenty-seven and in the House of Representatives a week later by 254 to 131. Then, at the end of April, President Eisenhower vetoed the bill, calling it "a major retreat from sound administrative policy." The next day the Senate voted sixty-four to twenty-nine to over-ride the veto. But the House upheld the President. The vote was 280 to 146 for over-riding—four votes short of the required two-thirds. In both votes the Democrats were almost unanimous for over-riding while the Republicans, except for a few farm-state defections, were as strongly against it. That left the Democrats without a law but with an issue that may tell against the Republicans in some of their farm strongholds—a charge that the Republicans want to curb rural electrification. On the other hand, the encounter may serve the President's interests. It left intact his record of never having a veto over-ridden. And by showing that the Democrats cannot force their will on him even when they are nearly unanimous, it may cause them to proceed cautiously in other areas, where they have been moving with less unanimity to go beyond his recommendations.

Increased Capacity of Floating Zone Refining

A STRIKING improvement in the floating zone refining technique, substantially increasing the volume of material which can be purified, has been developed by W. G. Pfann, K. E. Benson and D. W. Hagelbarger, of the Bell Telephone Laboratories. Paradoxically, the new technique also makes it possible to treat much thinner cross-



Improved floating zone refining apparatus for producing stable molten zones in a structure of large cross section

sections than have been feasible before.

The floating zone technique has proved highly valuable in producing extreme purity in reactive metals and semiconductors, because the molten material is never in contact with a container. However, it has been limited until now to use with small amounts of material. In conventional floating zone refining, a rod of the material to be purified is held in a vertical position, while a zone is melted by a heat source. The molten zone is held in place within the rod by its own surface tension. This zone is then made to move along the rod, and the impurities which collect in the molten material move to one end. The end is subsequently cut off, before the material is fabricated into devices. The primary limitation on the conventional method is the fact that, for any given material, there is a maximum height of molten zone which can be supported by the surface tension. Small diameter rods can be melted through easily without exceeding this maximum height. However, in larger diameters, by the time the rod has been melted through, the height of the zone has become so great that the surface tension can no longer hold the volume of molten material. The new method gets around this difficulty by using specially shaped cross-sections, such as flat plates and tubes. These shapes provide a cross-section small in thickness to permit melting through without exceeding the maximum height, and large in width to increase the total cross-sectional area treated. The inventors have shown that molten zones in such shapes are surprisingly stable.

For example, it is almost impossible to produce a stable molten zone in a 1in diameter iron rod because the maximum height of the zone is generally exceeded during the heating required to melt through the rod. However, it is relatively easy to melt the entire cross-section of a 2in diameter, ¼in wall tube of the same material, without exceeding this maximum height. Stable, wide molten zones have been maintained experimentally in one or both cross-sectional shapes, in materials such as silicon, iron, tin, gold, lead, bismuth and water. The new method works well at very small plate thicknesses in contrast to the rod floating zone method, in which the maximum stable zone height decreases to zero as the rod diameter decreases. Such a decrease in maximum zone height can be avoided in the new method. Hence, the treatment of sheets of the order of a few thou. in thickness becomes feasible. It is expected that increases in cross-sectional areas at least five to ten times those currently used will be feasible. Also, this new wide zone technique should make the floating zone method applicable to materials for which the conventional method is not practical. It appears that this new technique will greatly enhance the utility of the floating zone principle in the purification of reactive materials.

Colesberg Bridge

BY OUR SOUTH AFRICAN CORRESPONDENT

THE old single carriageway Colesberg Bridge spanning the Orange River midway between Phillippolis and Colesberg is almost a historic monument, having been originally built at the end of the nineteenth century, shelled and damaged during the Boer War, subsequently repaired and now due to be demolished to make way for its modern counterpart.

There are still a few local residents who have knowledge of the original construction and tell of the twelve years it took to build, when the main bulk of the materials were hauled by ox wagon from Port Elizabeth to the site. The bridge is on one of the three main overland routes from the Transvaal to the Cape Province through the Orange Free State, and is in a direct line from Johannesburg to Port Elizabeth and Mossel Bay.

Work was commenced in May, 1957, by the Roberts Construction Company on the building of a new, double carriageway, high level, reinforced concrete highway bridge to replace the old bridge. This new bridge, which is scheduled for completion towards the end of 1959, is of normal reinforced concrete construction, approximately 1300ft long with a 24ft wide clear carriageway. The structure consists of two abutments, and thirteen piers supporting nine spans of 75ft 6in, two spans of 100ft 6in, and three spans of 125ft 6in in length.

The foundations to the piers and abutments are founded on hard dolerite, at depths varying up to approximately 24ft below the natural ground level. Not much trouble was encountered in the construction of the foundations, with the exception of one located in midstream. Work on this foundation was undertaken during a low level flood period in June, 1958, when a cofferdam consisting of two rectangular boxes approximately 5ft apart, constructed of 9in by 3in grooved timbers and filled with silt and gravel, was formed and pumped dry, at which stage work on the foundation itself could be undertaken and successfully completed.

The pier shafts are of a standard hollow construction varying in height up to 70ft with the exception of four which are larger in section and carry a 52ft overall double cantilever. These four piers are prestressed in order that the additional compression provided by this prestressing will be sufficient to overcome the excessive tensions created by the unbalanced loading when only one span is carried by the cantilever.

The prestressing consists of fourteen No. BBRV cables, each comprising twenty-four No. 7mm H.T. steel wires, each cable being stressed to approximately 84 tons, and pressure grouted whilst in tension. These cables are anchored 15ft into bed rock and act through the foundation and the whole pier.

The superstructure has been designed to carry full B.M.T. loading, and consists of a road-deck slab, carried on four beams simply supported at the piers, and stiffened with diaphragm walls. The tops of the piers are fitted with fixed and free bearings, the bearings consisting of two mild steel plates separated by a ¼in thick lead plate.

The engraving shows a view of the bridge in its present state of construction, as seen from the south bank of the river.

Colesberg bridge during construction as seen from the south bank

As with most river bridge work a vital factor in construction and programme of work is an accurate assessment of weather conditions. In this particular case, one pier was positioned in the centre of the river and could only be constructed at low water level. Owing to the uneven surface of the river bed, complete sealing was not possible and several inrushes of water were dealt with while the work was in progress. The cofferdam and reinforced concrete foundation were completed in two-and-a-half weeks with very little variations in water level during this period. Daily meteorological reports were obtained during this time which proved of great assistance and gave approximately four days' warning of any large rise or fall in river level.

The Orange River at this point is subject to level variations of up to 30ft and with such variations there is an enormous increase in width of flow. The shuttering was therefore designed to be suspended from steel trusses launched over the previously constructed piers.

Materials for concrete were found close at hand along the river banks, where gravel layers had been found. This gravel, once washed and graded, gave an excellent coarse concrete aggregate. The fine aggregate, however, was not suitable and Vaal River sand for the superstructure had to be transported from Bothaville.

The whole service was designed and is being supervised by the Public Works Department.

Appointments

MR. D. J. BELL has been appointed resident director of the Indian Steelworks Construction Co Ltd., Durgapur, in succession to Brigadier M. H. Cox, who is to resign on August 10.

HARLAND AND WOLFF LTD. announces that Mr. H. R. Humphreys, general manager of the company's repair works has retired from his executive position and has been succeeded by Mr. A. O. Milne.

MR. T. J. BIRTLES has been appointed northern general manager of the Ruberoid Co. Ltd. in succession to Mr. G. E. Searson who has retired.

THE MINISTRY OF SUPPLY announces that Dr. N. J. L. Megson has been appointed director of materials research and development (air) in succession to Dr. H. Sutton, who will shortly be retiring from public service.

VICKERS LTD. announces that Sir Leslie Rowan has been appointed director of finance. He has also been appointed a director of Vickers-Armstrongs Ltd., and Robert Boby Ltd.

DR. JAMES BURNS has been appointed a member of the North Thames Gas Board, and will combine the duties with those of his present position of chief engineer.

MR. R. YEOMAN, general manager for the Hodgkinson Group of Foundries, has been appointed to the board of the parent company, James Hodgkinson (Salford) Ltd.

DR. C. P. HAIGH has vacated his position as head of the physics section of the nuclear development branch, Central Electricity Generating Board, and has been appointed director of the Berkeley Nuclear Laboratories.

THE UNITED STEEL COMPANIES LTD. announces that the metallurgy section has been reconstituted and that Dr. J. K. Irvine, head of the section, has been appointed deputy research manager. Mr. J. D. Murray has been appointed head of a new section, known as applied metallurgy, and Mr. F. B. Pickering has been appointed head of another new section on physical metallurgy.

AIR INDUSTRIAL DEVELOPMENTS LTD. has announced that Mr. E. R. Layen, sales manager, has been appointed general manager.

MR. G. V. PALMER, director of Winget Ltd., has been re-elected chairman of the council of the Institute of Export.

MR. P. A. HUFTON has been appointed head of the aerodynamics department, Royal Aircraft Establishment, Farnborough, in succession to Mr. L. F. Nicholson.

Business Announcements

THE GENERAL ELECTRIC CO. LTD., and WILD-BARFIELD ELECTRIC FURNACES LTD. announce that the repair and maintenance service for all G.E.C. valve-operated high frequency generators is now carried out by Wild-Barfield Electric Furnaces Ltd., Otterspool Way, Watford By-Pass, Watford, Herts (telephone Watford 26091).

LOTUS ENGINEERING CO. LTD. has announced the opening of its new factory at Delamare Road, Cheshunt, Herts (telephone Waltham Cross 4745). Work at Hornsey has been discontinued.

EKCO ELECTRONICS LTD. announces the formation of a new company in Italy, in association with Ing. Silvio Garrone, s.r.l. The company, Ekco Nucleare Italiana s.r.l., Via dei Malvezzi, Rome, will deal with the Italian market and will facilitate nuclear instrumentation in the fields of atomic reactors, industrial instrumentation and the sale of nucleonic and research development instruments.

SHELL CHEMICAL CO. LTD. states that in view of the growth of the company certain of the company operations have been integrated into three divisions, industrial chemicals, agriculture and plastics.

HONEYWELL CONTROLS LTD., Ruislip Road, Greenford, Middlesex, announces that it is the sole representative in this country for MacDonnel and Miller Inc., Chicago, U.S.A.

Contract

THE GENERAL ELECTRIC COMPANY LTD. has received a contract valued at over £1,250,000 for a complete iron ore preparation plant at the Redbourn Works, Scunthorpe, of Richard Thomas and Baldwins Ltd. The plant is designed for an initial throughput capacity of 1,750,000 tons of iron ore per annum,

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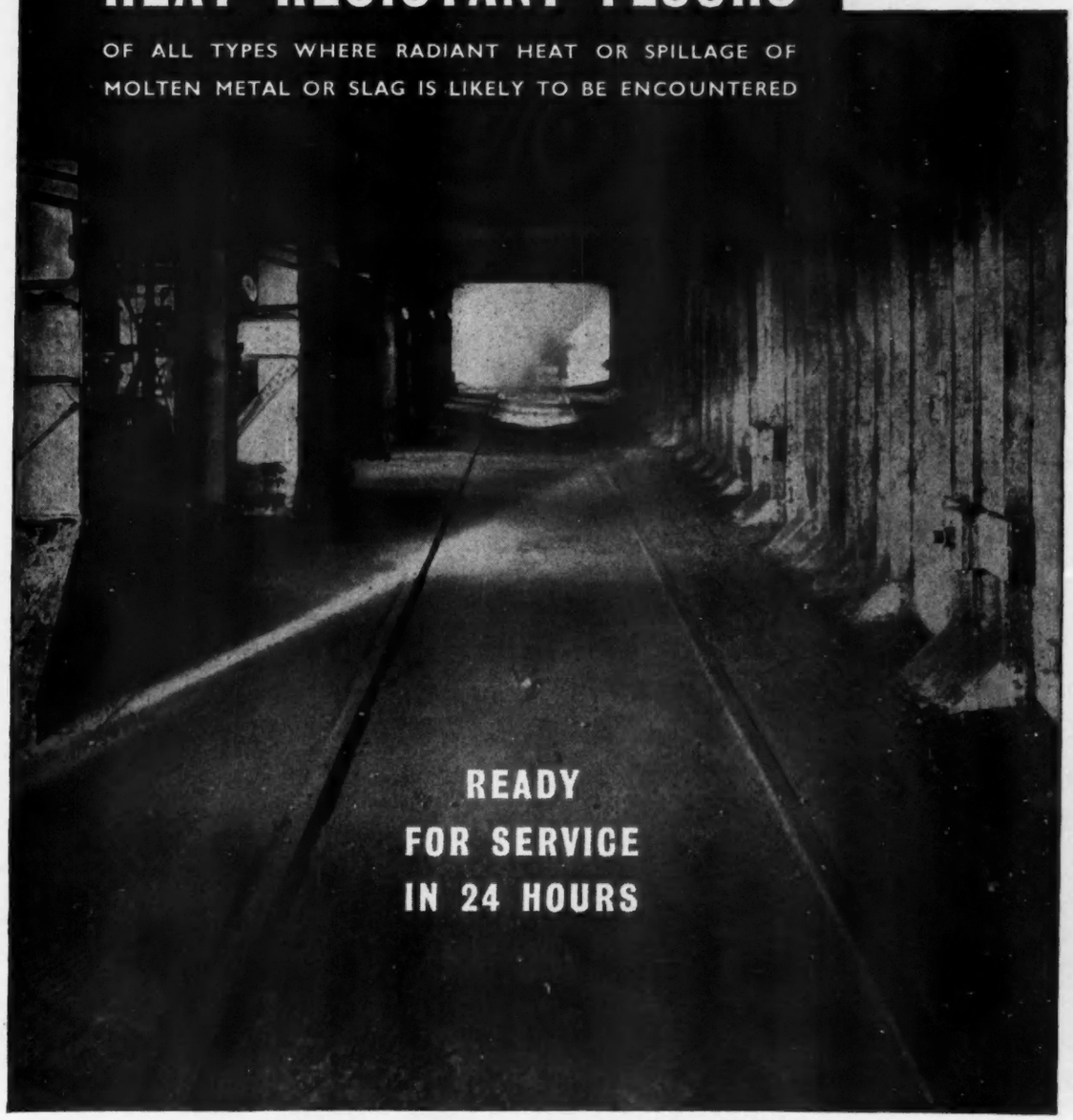

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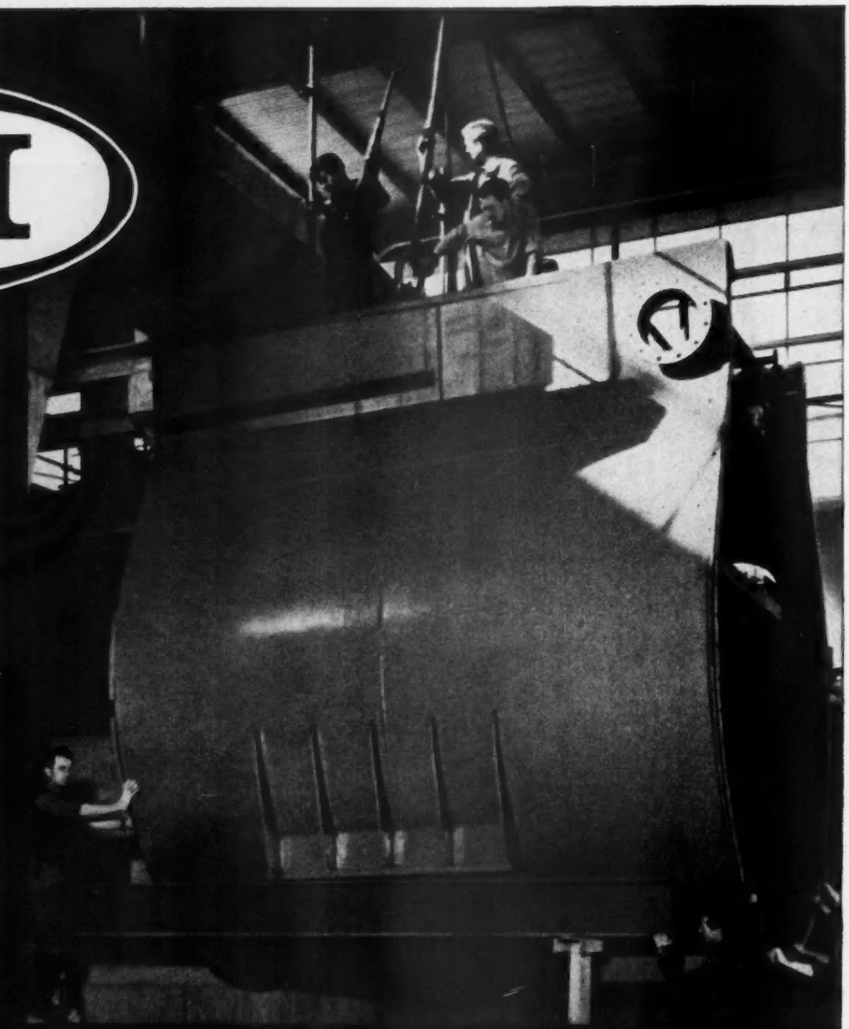
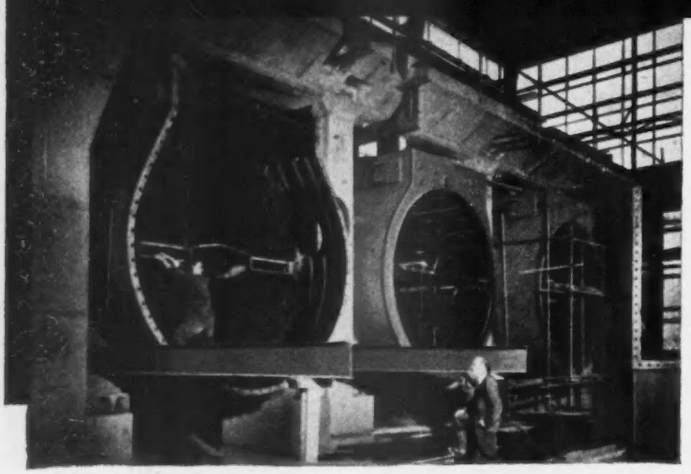


One unit of a three-shell surface condenser being placed in position at Berkeley, the commercial nuclear power station now under construction in Gloucestershire by the A.E.I.—John Thompson Nuclear Energy Company.

FOR BERKELEY NUCLEAR POWER STATION



A general view of three condenser shells in position at Berkeley.

The entire turbine-house heat exchange equipment for the new power station at Berkeley is being supplied by the A.E.I. Turbine-Generator Division, and manufactured at their factory at Germiston Glasgow.

Four three-shell main condensers — one for each of the four 83 MW mixed-pressure steam turbine-generators also being supplied by A.E.I.

Two-stage feedwater heating equipment for each turbine-generator.

Two 'dumped' steam condensers to handle surplus steam generated when commissioning the reactors, or in the event of a sudden shut down.

Other equipment in manufacture includes the steam jet air ejectors, water/water heat exchangers for the generator cooling circuit and general gas circulator service, oil coolers and generator hydrogen cooler units.

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TURBINE-GENERATOR DIVISION

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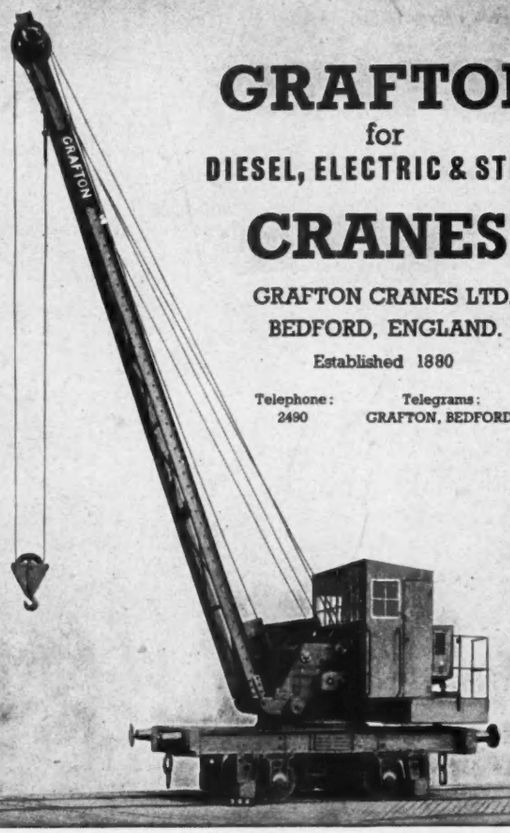

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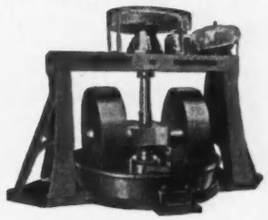

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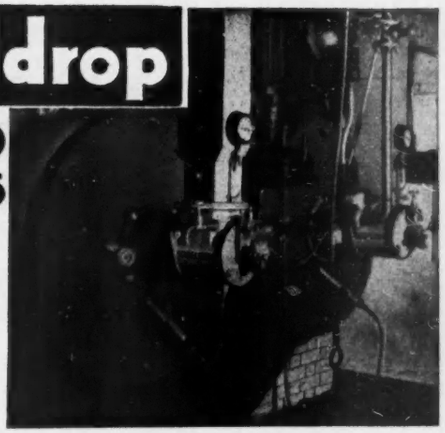

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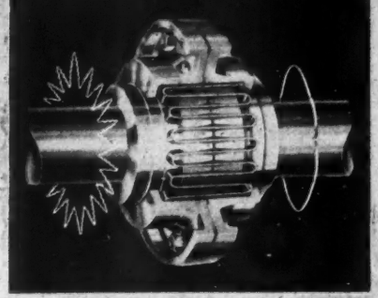

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PATENTS

THE PROPRIETOR of British Patent No. 725191, entitled "Indexing Mechanism for Machine Tools", offers same for license or otherwise to ensure practical working in Great Britain. Inquiries to Singer, Stern and Carlberg, 14 E. Jackson Blvd., Chicago 4, Illinois, U.S.A. E6810

THE PROPRIETOR of British Patent No. 749328, entitled "Fluid Actuated Reciprocatory Prime Mover", offers same for license or otherwise to ensure practical working in Great Britain. Inquiries to Singer, Stern & Carlberg, 14 E. Jackson Blvd., Chicago 4, Illinois, U.S.A. E6809

THE PROPRIETOR of British Patent No. 727,157 for "An IMPROVED APPARATUS FOR COMPENSATING GRINDING DISC WEAR IN INTERNAL GRINDING MACHINES", desires to enter into negotiations with a firm or firms for the sale of patent or for the grant of licences thereunder. Further particulars may be obtained from Marks & Clerk, 57 & 58, Lincoln's Inn Fields, London, W.C.2. 8E.683

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admit 16ft. between centres, swing
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